Five-Year Review Report

Third Five-Year Review Report
for
The Western Sand and Gravel Superfund Site
Burrillville and North Smithfield
Providence County, Rhode Island 02895

September 2003

Prepared by:
The United States Environmental Protection Agency
Region 1, New England
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Date:

September 26, 2003

Five-Year Review Report

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CAMU	Corrective Action Management Unit
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
CFR	Code of Federal Regulations
DWS	Drinking Water Standard
ESD	Explanation of Significant Difference
GRI/FS	Groundwater Remedial Investigation/Feasibility Study
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Contingency Plan
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PCE	Tetrachloroethene
PRP	Potentially Responsible Party
PSD	Performing Settling Defendant
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
RIDEM	Rhode Island Department of Environmental Management
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TCE	Trichloroethene
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The purpose of this five-year review is to determine whether the remedial actions at the Western Sand & Gravel site, located primarily in Burrillville, and partially in North Smithfield, Providence County, Rhode Island (the Site) are protective of human health and the environment and functioning as designed. This five-year review is for the entire Site (OUs I, II and III). The United States Environmental Protection Agency (EPA), Region I, conducted this review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 122(a), NCP Section 300.400(f)(4)(ii), and OSWER Directive 9355.7-03B-P (June 2001). It is a statutory review. This is the third five-year review for the Site covering the years 1998 through 2003.

The Site was a sand and gravel quarry operation from 1953 until 1975. From 1975 to April 1979, a portion of the Site was used for the disposal of liquid wastes including chemicals and septic waste. Unpermitted wastes were disposed of at the Site and over time, some of the wastes penetrated the porous soil and contaminated the groundwater. In 1979, hazardous wastes were no longer accepted at the Site, and in March 1980 EPA conducted a removal action at the Site during which approximately 60,000 gallons of VOC-contaminated liquids were pumped from lagoons. In 1982, the Rhode Island Department of Environmental Management (RIDEM), began a groundwater recirculation system in an effort to control the spread of groundwater contamination. In September 1983, the EPA added the Site to the CERCLA National Priorities List (NPL).

EPA has issued three Record of Decisions (ROD) for this Site. Under the first ROD (1984), water filters were installed on private wells until a permanent water supply system was constructed to serve the affected area (approximately 56 parcels) in 1992. The second ROD (1985) addressed contaminated soils at the Site. Contaminated soils were excavated and consolidated in a designated area within the Site. A RCRA Subtitle C cap was installed over the two-acre soil disposal area in 1987. This area of the Site was graded, and the cap and graded area were fenced and posted with warning signs. The fenced area of the Site comprises approximately six (6) acres. Post-closure monitoring and inspections of the cap and graded Site areas are ongoing. EPA issued the third ROD in 1991 to address groundwater contamination. The groundwater remedy selected for the Site is monitored natural attenuation until interim cleanup levels have been met, site monitoring and institutional controls. The 1991 ROD includes a contingency remedy for active pump and treat, which takes effect in the event that natural attenuation does not occur at the predicted rate.

The assessment of this five-year review found that the remedies continue to function as designed. The water supply system is operated and maintained safely. The landfill cap is in excellent condition and is being well maintained. Annual data reports demonstrate that natural attenuation of the groundwater is progressing at the predicted rates for the selected indicator compounds. Because the remedial actions at all the Operable Units (RODs 1, 2 and 3) at the Western Sand and Gravel Site are protective, the Site is protective of human health and the environment.

Five-Year Review Summary Form

Site name: Western Sand & Gravel
EPA ID: RID009764929

Region: 01	**State:** RI	**City/County**: Burrillville and N. Smithfield, Providence Cty

SITE STATUS

NPL status: Final
Remediation status: OU 1 and OU 2 complete. OU 3, monitored natural attenuation is underway.

Multiple OUs? YES	**Construction completion date:** 12/22/1992

Has Site been put into reuse? YES

REVIEW STATUS

Lead agency: EPA
Author name: James M Brown

Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA, Region 1 - New England

Review period: December 2002 to September 2003
Date(s) of Site inspection: March 1998, June 1998, September 1998, December 1998, March 1999, June 1999, September 1999, December 1999, March 2000, June 2000, September 2000, December 2000, March 2001, June 2001, September 2001, March 2002, September 2002 (site inspections were conducted at the time of the groundwater sampling events), August 2003.
Type of review: Post-SARA
Review number: 3 (third)
Triggering action: Previous Five-Year Review Report
Triggering action date *(from WasteLAN)*: 07/09/1998
/Due date *(five years after triggering action date)*: 07/09/2003

Five-Year Review Summary Form, cont'd.

Issues:

There were no health based or environmental issues identified during this five-year review period.

Data was missing from the 2002 Data Report (stream staff gauge readings) due to drought related conditions and conditions created by indigenous wildlife (a beaver dam) which prevented sampling crews from taking accurate readings of the stream staff gauges.

During routine inspections, small trees were observed to have taken root along side and on top of the cap. As observed, any vegetative matter with the potential to affect the integrity of the cap was removed.

Recommendations and Follow-up Actions:

Field crews will extend the markings on the staff gauges so that readings during low flow/drought conditions can be accurately measured during subsequent annual monitoring events. Since some of the staff gauges have been upset (i.e., knocked over), all gauges will be re-calibrated prior to any subsequent annual monitoring events.

Continue to monitor cap for potentially woody vegetation and remove as necessary.

Protectiveness Statement(s):

OU 1 involved the construction of a water supply system to provide residents in the affected area with a permanent supply of safe drinking water. The water supply system has been in operation since September 1994. The remedy at OU 1 is protective of human health and the environment.

OU 2 involved the consolidation of contaminated soils to the cap area and construction of an impermeable barrier over the consolidated contaminated soils. The OU 2 remedy continues to minimize the continued release of contaminants to the groundwater and prevents public exposure to the contaminated soils. The remedy at OU 2 is protective of human health and the environment.

OU 3 relies on monitored natural attenuation of contaminated groundwater with a contingency for active pump and treat, and institutional controls to prevent the use of groundwater in the affected area. It was originally projected that natural attenuation would require 24 to 28 years to achieve the target cleanup concentrations. During the most recent sampling event in September 2002, three of the four indicator compounds were at or below the target concentrations, and the extent of the contaminant

Five-Year Review Summary Form, cont'd.

Protectiveness Statement(s), cont'd:

plume continues to decrease. The remedy at OU 3 is expected to be protective upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Because the remedial actions at all OUs at the Western Sand and Gravel Site are protective, the Site is protective of human health and the environment.

Other Comments:

There are no additional comments at this time.

1.0 INTRODUCTION

The purpose of the five-year review is to determine whether the remedies at a site are protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency, Region 1 (EPA), conducted this five-year review of the remedial actions implemented at the Western Sand and Gravel (WS&G) Site (hereinafter referred to as the Site), located on Douglas Pike (also known as Route 7), on the boundary of Burrillville and North Smithfield, in Providence County, Rhode Island. This review was conducted in accordance with OSWER Directive 9355.7-03B-P, "Comprehensive Five-Year Review Guidance" (June 2001).

This is the third five-year review for the Site. The triggering action for this statutory review was the submission of the 1998 Five-Year Review Report. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

The chronology of significant Site events and dates is included in Table 1.

Table 1 - Chronology of Site Events

Event	Date
Site operated as a sand and gravel quarry.	1953 to 1979
Approximately 12 acres of the Site used for disposal of liquid wastes.	1975 to 1979
Joint meeting of Burrillville and North Smithfield Town Councils to discuss concerns about Western Sand and Gravel Site.	January 1979
RI Department of Health.	February 1979
RIDEM sends Western Sand and Gravel an Notice of Violation for violation of water and air pollution regulations, odors and for failing to prepare complete and accurate industrial waste manifests.	February 1979
RIDEM issues Cease and Desist Order.	April 24, 1979
Under Consent Agreement with RIDEM six groundwater monitoring wells installed and sampled and tested positive for toluene, xylene, chloroform, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, and dichloromethane.	November 1979
RIDEM issues a Consent Decree, a Show Cause Order on Closure, and a Final Closure Order for pumping chemical wastes from the lagoons.	November 1979
EPA pumps out lagoons.	1980
RIDEM installs groundwater re-circulation system.	November 1982
Final Listing on the NPL.	September 8, 1983
OU 1 RI/FS Complete	September 28, 1984
OU I Final ROD Date.	September 28, 1984
OU II RI/FS Complete.	September 30, 1985
OU II Final ROD Date.	September 30, 1985
Approximately 45 PRPs entered into a Consent Decree to pay EPA for the estimated cost of the waterline construction and perform all the other activities required in the OU I and OU II RODs.	June 5, 1987
OU II Remedial Design Complete	June 12, 1987
OU II Remedial Actions Complete	March 29, 1989
OU I Remedial Design Complete	March 29, 1989
OU III RI/FS Complete	April 16, 1991
OU III – Final ROD date. Natural attenuation w/ contingency for pump & treat.	April 16, 1991
Five PRPs enter into a Consent Decree to perform OU III remedy.	February 21,1992
Administrative Settlement with one PRP that failed to join the 1992 CD	August 11, 1992
Preliminary Close-Out Report	December 22,1992
First Five Year Review	December 23, 1992
OU III Natural Attenuation Design Complete	February 1, 1993
OU I Remedial Action Complete	September 26, 1994
Second Five Year Review	July 9, 1998
Prospective Purchaser Agreement with Supreme Mid-Atlantic Corporation	October 2001

3.0 BACKGROUND

3.1 Physical Characteristics

The Site, is located on the boundary of Burrillville and North Smithfield, in Providence County, Rhode Island. A map depicting the general location of the Site is provided as Figure 1 (Appendix A). The Site consists of approximately 25 acres of land and is located in an area generally described as being semi-rural. The general layout of the Site is shown on Figure 2 (Appendix A).

The Site is located over the Slatersville Aquifer that has been designated as a drinking water source by the State of Rhode Island. Other potentially environmentally sensitive areas near the Site include Tarkiln Brook and the Slatersville Reservoir, both of which are classified as Class B water bodies. According to the Rhode Island Water Quality Standards, Class B water bodies are suitable for fishing, swimming, and other recreational purposes. There is also a wetland area near the Site that borders Tarkiln Brook. Residential areas are located to the west and north of the Site, with the nearest residence being approximately 1,000 feet northwest of the Site. Groundwater has also been confirmed to discharge into Tarkiln Brook and the Slatersville Reservoir.

3.2 Land and Resource Use

The Site was operated as a sand and gravel quarry from 1953 until 1979. From 1975 to April 1979, a portion of the site was used for the disposal of liquid wastes including chemicals and septic waste. Contents of tank trucks were emptied directly into open lagoons and pits, none of which was lined with protective materials. Over time, some of the wastes penetrated the porous soil and contaminated the groundwater.

In October 2001, a Prospective Purchaser Agreement between EPA – Region 1 (New England) and Supreme Mid-Atlantic Corporation (Supreme) was signed. Supreme purchased the 25-acre Site. The projected land use of the capped portion of the Site (approximately 6 acres) will be limited by the utilization of institutional controls. The land south of the capped portion of the Site (approximately 19 acres) is currently being developed by Supreme as a truck body assembly plant. The 19 acre area under development is generally upgradient of the impacted groundwater.

3.3 History of Contamination

From 1975 to April 1979, a portion of the Site (approximately 12 acres) was used for the disposal of liquid wastes including chemicals and septic waste. Contents of tank trucks were emptied directly into open lagoons and pits, none of which were lined with protective materials. Initially the Site was only permitted to accept sewage wastes. Over time, the wastes disposed of at the Site included chemical wastes that eventually penetrated underlying porous soils and contaminated the groundwater. The total volume of materials disposed of at the Site is unknown. RIDEM records indicate that approximately 470,000 gallons of waste were deposited at the Site during its last year of operation.

A fire occurred in one of the chemical pits in March 1977. At that time, local fire officials ordered the Site owner and operator to remove the chemicals from the waste pit. Reportedly, the Site owner responded by burying the contents from the waste pit. It was also during 1977 that nearby residents began complaining about odors from the Site. During February 1979, due to concerns regarding local water

supplies, nearby wells were sampled by the Rhode Island Department of Health (RIDOH). In April 1979, RIDEM issued a Cease and Desist Order for violations of water and air pollution regulations.

3.4 Initial Response

In 1979, the Rhode Island Department of Environmental Management (RIDEM) issued a Cease and Desist Order for violations of water and air pollution regulations at the Site.

In 1980, EPA performed a removal at the Site during which approximately 60,000 gallons of VOC-contaminated liquids were pumped and removed from the lagoons. This action was taken under the authority of Section 311 of the Clean Water Act, prior to the passage of CERCLA.

The Site was proposed for listing on the NPL in October 1981, with final listing on the NPL in September 1983.

In 1982, RIDEM as the lead Agency, began a groundwater recirculation system in an effort to control the spread of groundwater contamination. RIDEM and EPA conducted RI/FS studies at the Site during 1982 to 1985 for OU's one and two.

3.5 Basis for Taking Action

In September 1984, RIDEM completed the first RI/FS for the Site under a cooperative agreement with EPA. The conclusions of the RI were as follows:

- Organic chemicals had infiltrated through highly permeable soil into the groundwater.
- Organic chemicals had migrated from the Site through the upper fractured bedrock and residential wells down gradient from the Site were contaminated.
- Contamination had migrated to and had affected the quality of drinking water in nearby residential wells.
- Contaminated groundwater had discharged into nearby Tarkiln Brook and Slatersville Reservoir.
- Contaminated soil and sludge existed in various locations on the Site.
- Hazardous air emissions were not detected at the Site.

Action was taken at the Site since both human and environmental receptors exist and could potentially be exposed to contaminants occurring at concentrations in excess of state and Federal standards. The primary exposure to Site contamination would be through direct contact and/or ingestion of soils, sludges, and sediments in waste basins/lagoons and areas immediately adjacent to the waste basins/lagoons; direct contact and/or ingestion of surface water; and ingestion of contaminated groundwater. The ROD for OU III listed the following primary contaminants of concern:

Organics

benzene, chlorobenzene, toluene, xylenes, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, 1,2-dichloroethane, 1,1-dichloroethane, and dichloromethane.

Inorganics

arsenic, chromium, and lead.

4.0 REMEDIAL ACTIONS

4.1 Operable Unit 1 Remedy Selection/Implementation

In September 1984, EPA issued the first ROD for the Site with the following remedial objectives:

- To provide residents in the affected area with a permanent supply of safe drinking water.
- Abate local sources of contamination at the Site.
- Minimize future public health risks by restricting site access.

To achieve these objectives the ROD specified:

- The installation of water filters as an Initial Remedial Measure (IRM) to provide protection for homes where contaminants were identified in their wells, until the permanent alternate water supply became functional.
- The installation of a permanent alternate water supply to service approximately 56 parcels of land.

Starting in August 1984, Olin Hunt Specialty Products, Inc. (Olin), a potentially responsible party (PRP) at the Site, installed water filters in private homes with contaminated wells and in homes that might become contaminated. EPA began construction of the permanent water supply system in April 1990. The water supply system became operational and functional in September 1994.

4.2 Operable Unit 2 Remedy Selection/Implementation

In September 1985, EPA issued a second ROD for the site with the following additional remedial objectives:

- Contain or remove sources of contamination at the Site to minimize the continued release of contaminants to the groundwater and future public exposure and health impacts.
- Mitigate the environmental impact of contaminated groundwater.

To achieve these objectives the ROD specified:

- The grading of contaminated soil to the cap area.
- The installation of an impermeable cap consistent with RCRA provisions.
- The phasing out of the groundwater recirculation system, and the removal and disposal of the associated equipment.
- The final grading of the Site with loam and the seeding of the cap and surrounding surface.
- The securing of the Site with a fence and posting of the Site.

This ROD also required the following operation and maintenance activities:

- The inspection and maintenance of the cap, fence, and postings consistent with RCRA provisions.
- Continued groundwater monitoring consistent with RCRA post-closure provisions.

Construction activities for OU II were complete by March 1989. All contaminated soils were excavated and consolidated under approximately 2-acres of impermeable cap (RCRA C). The Site was graded and the cap and graded area are fenced and posted with warning signs. The fenced area comprises approximately 6-acres of the 25 acre Site. Post-closure monitoring and inspections of the cap and graded areas are ongoing.

4.3 Operable Unit 3 Remedy Selection/Implementation

In April 1991, EPA issued the third and final ROD for the Site with the following remedial objectives:

- Restore contaminated groundwater in the overburden aquifer, from the boundary of the existing cap to the outer boundary of the contaminant plume, to state and federal ARARs, including drinking water standards, and to a level that is protective of human health and the environment as soon as practicable.
- Restore contaminated water in the bedrock system, to state and federal ARARs, including drinking water standards, and to a level that is protective of human health and the environment as soon as practicable unless EPA determines, based on additional information, that contamination in the bedrock does not exceed protective levels.
- Protect uncontaminated groundwater and surface water for current and future use.
- Prevent human and animal exposure to contaminated groundwater.
- Protect environmental receptors.

To achieve these objectives the ROD specified:

- Reliance on natural attenuation of contaminated groundwater with a contingency to perform active restoration. According to the hydrogeologic models, groundwater is expected to be restored to the interim cleanup levels in approximately 24 to 28 years. Active restoration, for which a work plan has been developed, will be implemented, according to the ROD, if natural attenuation is not restoring the groundwater at a rate predicted by modeling or faster.
- Utilization of institutional controls to reduce the risk to public health from consumption of groundwater.
- Implementation of a Site monitoring program to include long term monitoring of the groundwater.

The interim cleanup levels for four indicator compounds have been established for the site to determine if natural attenuation is working as predicted by the model or faster. These compounds and cleanup levels are presented below:

Benzene	5 ug/l
Vinyl Chloride	2 ug/l
Trichloroethene	5 ug/l
Tetrachloroethene	5 ug/l

Specifications for performance of periodic evaluations of the natural attenuation remedy are found

in Section 4.2 of the Site Monitoring Plan. The first evaluation was completed three years from the date of lodging of the Consent Decree. The Consent Decree was lodged February 26, 1992. This first evaluation was completed in accordance with the Site Monitoring Plan and Consent Decree Statement of Work and was presented in Appendix E to the 1994 Data Report, dated February 1995. The evaluation showed that the statistical test passed without considering outliers for the indicator compounds tetrachloroethene, trichloroethene, and vinyl chloride. The report made recommendations regarding treatment of outliers for the indicator compound benzene and a further recommendation regarding modification of the benzene theoretical curve based on new information derived from a recent review of the groundwater modeling assumptions and modeling parameters reported in the literature.

Subsequent to that evaluation, four consecutive quarters of benzene maximums at or below the theoretical curve had been achieved. However, for the period December 1995 through December 1996, three of the five quarters were above the theoretical curve for benzene. As a result, and consistent with Section III(A)(1)(a)(3), page 7 of the Consent Decree Statement of Work, another Periodic Evaluation of the data was completed and submitted to the agency in April 1997. That evaluation identified proposed changes to the statistical tests, which are consistent with the language and intent of the ROD. Additionally, other trend analyses of the data indicate that natural attenuation is occurring at the site consistent with the overall compliance schedule in the ROD.

The proposal for modification of the statistical test consistent with the intent of the ROD received agency concurrence in the course of the development of the Five-Year Review, Type 1A, for Operable Unit No. 3 (April 1998). With this modification, the need for active remediation will be evaluated only if both of the following conditions are met:

- In applying the Wilcoxon Rank Sum Test, the null hypothesis is rejected in favor of the alternative hypothesis that attenuation is occurring at a rate slower than predicted by the theoretical curve. This will occur if $T^{+} \geq t(\alpha , n)$

- Least squares regression fails to identify a statistically significant negative slope at the 95 percent confidence level.

The implementation of the remedy under OU III – natural attenuation – continues to be monitored as required in the ROD. To date, groundwater-monitoring events have demonstrated that natural attenuation is occurring at the Site and there is no need for any additional remedy implementation. During the five-year review period concentrations of the indicator compounds continue to decrease and all four indicator compounds passed the Wilcoxon Rank Sum Test during this five-year review period. There is also a significant negative slope for the least squares regression that indicates that benzene is continuing to decrease over time. Tables and figures presenting the statistical evaluation from initiation through the September 2002 sampling event for the four indicator compounds are presented in Appendices B and C, respectively.

Isoconcentration maps for the years 1998 through 2002 (as presented in the annual reports during this five-year review period) are provided in Appendix D. These maps show the concentration contours for total volatile organics based on the single highest total volatile organic concentration detected in each well for all sampling events during the respective year.

4.4 System Operations/Operation and Maintenance (O&M)

The water supply system is operated and maintained by a privately owned water district (Nasonville

Water District). The RIDOH is responsible for ensuring that the water supply system is being operated and maintained properly and remains protective of human health.

The PRPs have continued to conduct routine system operations/O&M that has consisted of the Site inspections and general maintenance of the grounds. In addition, the PRPs continue to monitor the performance of the remedy based on groundwater sampling events. Quarterly progress reports and annual data reports have been submitted to the EPA for the years cited below. All O&M activities during the five-year review period were conducted during the regular sampling events as noted below:

1998	1999	2000	2001	2002
March 1998	March 1999	March 2000	March 2001	March 2002
June 1998	June 1999	June 2000	June 2001	***
September 1998*	September 1999**	September 2000*	September 2001**	September 2002*
December 1998	December 1999	December 2000	***	***

*: Annual Event
: Biannual Event *: Sampling event eliminated from overall system monitoring program.

Since the remedy relies on natural attenuation of contaminated groundwater to achieve the goals set forth in the ROD, an annual data review is also conducted to assess whether the remedy performance standards are being satisfied.

5.0 PROGRESS SINCE THE LAST REVIEW

In the second Five-Year Review, dated July 1998, EPA certified that the remedy selected for this Site remains protective of human health and the environment. Since the concentrations of the indicator compounds decreased at the rate predicted by the theoretical curve, or faster, it was recommended that the natural attenuation remedy be allowed to continue. The previous five-year review did not target any specific issues or additional recommendations.

During the course of this five-year review period, EPA and RIDEM were petitioned by the PRPs to decrease the number of wells sampled and the frequency that the wells were sampled. This request was made since the indicator compounds continued to decrease at the rate predicted by the theoretical curve. The proposed modifications were considered in no way to impact the ongoing routine monitoring program and the evaluation of the effectiveness of the remedial action. The proposed changes to the remedial program included the following:

- Temporary sealing and/or permanent abandonment of selected onsite wells;
- Reduction in the frequency of the groundwater sampling schedule; and
- Reduction in the frequency of the collection of hydrogeologic monitoring data.

Temporary Sealed Wells

Temporarily sealing of selected monitoring wells was proposed to ensure security to the aquifer. By doing this, it was proposed to remove these wells from the biennial sampling event, but keep the wells intact for the final attainment sampling. The wells would be sealed at the surface with metal plates that would be

removed for the final sampling event at the completion of the monitoring program.

The rationale for the selection of wells for temporary sealing was as follows:

- The proposed wells lacked contamination, as evidenced by results obtained from the previous biennial sampling events - September 1997 and September 1999.
- The effectiveness of the cap is monitored by other wells located between the cap and the wells proposed for sealing.

The following is a listing of the wells that were requested to be temporarily sealed and therefore removed from the biennial sampling event. Although wells II1S and II1D were not a part of any sampling program at the time, it was requested that they also be temporarily sealed so that they may be available for the attainment sampling event at the completion of the routine monitoring program.

I1S	I5D	II1D	II4M	II6S	PZ-4	PZ-9
I1M	I8S	II2S	II4D	II6M	PZ-5	
I1D	I8M	II2M	II5S	II6D	PZ-6	
I5S	I8D	II2D	II5M	II7S	PZ-7	
I5M	II1S	II4S	II5D	PZ-1	PZ-8	

Other wells which were only sampled on a biennial basis (well clusters I2, I3, I4, I6, I7, C1, C2, and C3) were not requested to be removed from the routine monitoring program due to their strategic locations for identifying contamination outside of the currently known plume (acting as sentinel wells) and/or the current presence of low levels of volatile organic contamination in the wells.

Permanently Abandoned Wells

Additionally, it was proposed by the PRPs to permanently abandon several of the onsite wells because they are no longer or never have been part of the sampling program, and they present a potential for contaminates to enter the aquifer. In the case of some of the earlier installed bedrock wells that may not have an adequate seal (II3B and C4B), the potential for introduction of overburden contaminants into the limited bedrock groundwater system is a concern.

Presented below are the wells for which permanent closure was requested and the associated rationale:

Well Identification	Permanent Abandonment Rationale
I1B	Not a productive well/not being used for sampling
I9B	Not a productive well/not being used for sampling
II3B	Not being sampled/potential cross contamination between overburden and bedrock
C4B	Not being sampled/potential cross contamination between overburden and bedrock
A-3	OU-2 Well/Not a part of the current sampling program
C	OU-2 Well/Not a part of the current sampling program
E	OU-2 Well/Not a part of the current sampling program
E-3	OU-2 Well/Not a part of the current sampling program

DW-5	OU-2 Well/Not a part of the current sampling program
GZ-1	OU-2 Well/Not a part of the current sampling program
GZ-4	OU-2 Well/Not a part of the current sampling program
GZ-5	OU-2 Well/Not a part of the current sampling program

Groundwater Sampling Frequency

Based on the results of collected data to date and the overall success of the ongoing remedial program, the PRPs proposed the reduction of the groundwater sampling schedule to biannual versus the quarterly schedule at the time. A proposal was made to keep the current sampling schedule for the months of March and September, and delete the June and December sampling events since they represent collection of only limited seasonal data that has been sufficiently characterized/evaluated. This reduction would only eliminate the collection of data from well clusters C-4, C-5, C-6, and II-3 for two quarters. Due to the demonstrated stability of the plume and the abundant data from these four well clusters, the PRPs felt that the proposed reduction to the sampling program was justified.

Hydrodynamic Monitoring

Based on the previous 9 years of quarterly groundwater piezometric data, groundwater has been flowing in the same direction consistently in the shallow, medium, and deep intervals of the overburden aquifer. Additionally, measurements have also shown consistency in the recharge and discharge areas as evidenced in the groundwater flow net evaluations for each quarter. Based on this information, it was proposed by the PRPs to limit the site wide groundwater level measurements to once a year for the remaining wells which are not sealed or abandoned. The annual measurements would be conducted during the September groundwater sampling event.

SUMMARY OF MODIFICATIONS

EPA and RIDEM approval for the requested program modifications was granted (correspondence dated August 7, 2001) with the following exception:

- The wells that were initially proposed to be permanently abandoned will instead be temporary sealed as approved, using the same specifications for temporary modification as detailed in previous correspondence.

Well sampling beginning in September 2001 was conducted in accordance with the EPA approval in the reduction of sampling frequency and locations. Specifically, samples were not collected from twenty-two (22) of the previously required locations during the biennial sampling event. The sampling locations approved for elimination from the groundwater monitoring program included the following:

I1S, I1M, I1D, I5S, I5M, I5D, I8S, I8M, I8D, II2S, II2M, II2D, II4S, II4M, II4D
II5S, II5M, II5D, II6S, II6M, II6D, II7S

Temporary well sealing was completed at the site during the March 2002 and September 2002 site monitoring events in accordance with approved specifications.

Redevelopment

In October 2001, a Prospective Purchaser Agreement between EPA – Region 1 (New England) and Supreme Mid-Atlantic Corporation (Supreme) was signed. Supreme purchased the 25-acre Site. The projected land use of the capped portion of the Site (approximately 6 acres) will be limited by the utilization of institutional controls. The land south of the capped portion of the Site (approximately 19 acres) is currently being developed by Supreme as a truck body assembly plant. The 19 acre area under development is generally upgradient of the impacted groundwater.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

The Western Sand & Gravel site's five-year review team was led by Mr. James M. Brown, EPA Region 1 Remedial Project Manager for the Site. The review components included:

- site inspection;
- data review;
- review of annual data reports;
- review of site inspection reports;
- interviews with local officials and residents; and
- development and review of the Five-Year Report.

Soon after the review and approval of this five-year review report, a notice will be placed in a local paper announcing that the five-year review report is complete and that it is available to the public at the Site repositories as listed below:

Burrillville Town Hall
105 Harrisville Main Street
Harrisville, Rhode Island 02830

EPA – Region 1 (New England) Records Center
One Congress Street
Boston, Massachusetts 02114-2023

6.2 Community Notification and Involvement

During this five-year review period, there were no public hearings or public meetings. However, US Senator Lincoln Chafee and other state and local officials visited the Site in 2001. Community involvement activities during the five year review period were limited to the submission of the annual data reports to the local and Federal repositories listed above (i.e., the Burrillville Town Hall and the EPA – Region 1 New England Records Center).

In October 2001, a Prospective Purchaser Agreement between EPA and Supreme Mid-Atlantic Corporation was signed. Supreme Mid-Atlantic Corporation subsequently purchased the 25-acre Site and

is currently developing the Site as a truck body assembly plant. Construction is scheduled to be complete in the Fall of 2003.

In January, 2003, EPA performed exploratory trenching and soil sampling at the Western Sand and Gravel site. The exploratory trenches and soil sampling was performed in response to community concerns regarding the current development of the Site by Supreme Mid-Atlantic Corporation. Specifically, dark color soils encountered during Site grading operations in areas that some residents believe pits and/or lagoons were once located and never remediated as part of the Superfund cleanup plan.

Soil samples were sent to a lab where they were analyzed for a variety of metals, semi volatile and volatile organic compounds (VOCs), pesticides and PCB's. Based on observations of the four test pits, no significant visual evidence of old disposal pits or lagoons could be found. A few isolated areas of dark soil were observed. Chemical analysis of this dark soil indicates low levels of organic contamination and metals. The concentrations were below any levels of concern for the planned industrial use of the Site.

Based on visual evidence, the results of the chemical analysis and existing institutional controls on groundwater use EPA determined that additional investigations are not warranted at this time. EPA has consulted with RIDEM and they concur with this conclusion. In addition, RIDEM tested groundwater wells in two nearby residences and determined that they were not being impacted by contaminants of concern from the Site. One of the residential wells will be tested again in the near future.

6.3 Document Review

This five-year review consisted of a review of relevant documents including the RODs, the 1992 and 1998 Five-Year Review Reports, annual groundwater monitoring reports, inspection reports, and a review of current regulatory guidelines (state and federal) to confirm that standards have not changed with respect to the remedy.

6.4 Data Review

No new monitoring data associated with OU I was generated during the five-year review period. All new residential and commercial development in the Site vicinity is required to be connected to the public water supply.

Ongoing tasks associated with OU II include regular inspection and monitoring of the landfill cap during routine Site monitoring events. During this five-year review period, the integrity of the cap remained intact. Minor woody vegetation observed on the cap and along the cap fence line was removed as necessary.

Tasks for OU III include ongoing groundwater monitoring for select wells at the Site, Site inspections, and annual reporting of results. Groundwater flow throughout this five-year review period has been to the north, with groundwater ultimately discharging into local streams. All piezometric data and groundwater flow maps that were generated during the 5-year period are presented in Appendix E.

Overall, the data indicate that natural attenuation is occurring at the Site as evidenced by the downward trends of select indicator compounds (PCE, TCE, vinyl chloride, and benzene) as indicated on Figures 3 through 6 (Appendix C). The indicator compound data have been assessed since 1998 by applying the following analyses to the groundwater data:

- the Wilcoxon Rank Sum Test (all four indicator compounds), and
- least squares regression (benzene only).

If applying the Wilcoxon Sum Test, the null hypothesis is rejected in favor of the alternative hypothesis, natural attenuation is occurring at a rate slower than predicted by the theoretical curve (this will occur if $T^{+} \geq t(\alpha , n)$). Should this occur, an alternative (i.e., more proactive) remedy would be required.

The benzene concentrations over time were also evaluated by plotting the least squares regression of the data (Figure 7, Appendix C). Should this plot fail to identify a statistically significant negative slope at the 95 percent confidence level, an alternative remedy would be required.

During this five-year review period, the statistical analysis confirmed that natural attenuation is occurring at the Site.

Laboratory analytical results for this five-year review period are summarized below with respect to the individual indicator compounds of concern, focusing on the two sampling events for 2002:

- Benzene concentrations exceeded the theoretical concentration five times during this five-year review period. During the last two sampling events for this five year review period (March and September 2002), the maximum benzene concentration detected was 4.0 micrograms per liter (µg/l) and 1.0 µg/l respectively. Both below the theoretical and target concentrations of 5.0 µg/l.

- Tetrachloroethene (PCE) concentrations slightly exceeded the theoretical concentration once during this five-year review period (June 2001). During the most recent sampling events (March and September 2002), PCE was detected at a maximum concentration of 5.8 µg/l during the March 2002 event, below the declining theoretical concentration of 18.7 µg/l, but above the target concentration of 5.0 µg/l. The maximum PCE concentration during the September 2002 event was 2.5 µg/l, below both the declining theoretical concentration of 17.8 µg/l and the target concentration of 5.0 µg/l.

- Trichloroethene (TCE) concentrations exceeded the theoretical concentration twice during this five-year review period (June 1999 and March 2002). During the March 2002 sampling event, TCE was detected at a maximum concentration of 15 µg/l, above the declining theoretical concentration of 8.3 µg/l. However the maximum TCE concentration detected during the most September 2002 event was 2.8 µg/l, below both the declining theoretical concentration for September (7.4 µg/l) and the target concentration of 5.0 µg/l.

- Vinyl chloride concentrations exceeded the theoretical concentration six times during this five-year review period (March 1998, March 1999, September 1999, September 2000, March 2001 and September 2001). However, during the 2002 sampling events, vinyl chloride was detected at maximum concentrations of 2.1 µg/l and 1.2 µg/l during the March and September events, respectively. The detected maximum concentrations were below the theoretical concentration of 5.0 µg/l. The maximum March concentration was above the target concentration of 2.0 µg/l, while the maximum September concentration was below the target concentration.

During this five-year review period, all four indicator compounds (benzene, PCE, TCE, and vinyl chloride) passed the Wilcoxon Rank Sum Test during each sampling round. There is also a significant negative slope for the least squares regression that indicates that benzene is continuing to decrease over time. Tables and figures presenting the statistical evaluation from initiation of the monitoring program through the

September 2002 sampling event, for the four indicator compounds, are presented in Appendices B and C, respectively.

6.5 Site Inspection

The Site was inspected by ATC during groundwater sampling events. Site inspections were conducted during each of the groundwater sampling events conducted during 1998 (March, June, September and December), 1999 (March, June, September and December), 2000 (March, June, September and December), 2001 (March, June, and September), and 2002 (March and September). Overall, there were no conditions identified that would compromise the remedy. The general maintenance activities included: replacement of rusted locks, maintenance of vegetation along fence lines; removal of young trees sprouting in southern portion of the Site, elimination of animal burrows under the fence (which were filled in), and replacement of posted warning signs along the fence. During the March 2002 event, ATC noticed that some small trees had established themselves along the edge of the cap. These trees were removed before they could damage the cap. Site inspection reports are provided in Appendix F.

The cap was generally observed to be well maintained. There were no observed low spots or ponded waters, no erosional damage, and no observed animal burrows in the cap. Appendix G is a photographic summary of general Site conditions as observed during a recent Site inspection.

6.6 Interviews

There were no interviews conducted during this five-year review period.

7.0 TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

The remedy continues to function as intended by the three Records of Decision for the Site. The water supply system is operated and maintained safely. The landfill cap is in excellent condition and is being well maintained. Annual data reports clearly demonstrate that natural attenuation of the groundwater is progressing at or faster than the predicted rates for the selected indicator compounds.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Based on a review of the most current state and federal regulations, the target cleanup levels remain valid. There have been no changes to the regulations to warrant any further review of the existing target groundwater concentrations. There have also been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The most recent state regulation for assessment of groundwater quality applicable to the Site is listed below:

- *Rules and Regulations for Groundwater Quality*, State of Rhode Island and Providence Plantations Department of Environmental Management, Division of Groundwater and Individual Sewage Disposal Systems, Regulation 12-100-006, promulgated May 1992, last amended August 1996.

The most recent Federal regulation for assessment of groundwater quality applicable to the Site is listed

below:

- *Code of Federal Regulations, Title 40 – Protection of Environment Chapter I – Environmental Protection Agency, Part 141 – National Primary Drinking Water Regulations.*

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Conditions at the Site remain relatively unchanged since the inception of the RODs. There have been no changes to Site usage or the use of adjacent properties that would call into question the protectiveness of the remedy. The regulations governing groundwater quality at the Site remain unchanged.

The land south of the capped portion of the Site is currently being developed as a truck body assembly plant. The area under development is generally upgradient of the impacted groundwater and measures approximately 19-acres. Since this work is upgradient of the impacted groundwater, and as long as these development activities do not encroach upon the capped portion of the Site, and public water is utilized, the remedy remains protective of both human health and the environment.

7.1 Technical Assessment Summary

According to the data reviewed for this five-year period and the site inspections conducted during groundwater sampling events, the remedy is functioning as intended by the three RODs for the Site. There have been no changes in regulatory statutes as they would pertain to the target levels, and no new pathways for exposure identified, that would call into question the goals of the remedy as set forth in the RODs. Overall, groundwater concentrations continue to decline at rates faster or equal to predicted rates. In fact, three of the four target compounds were at or below the target concentrations during the most recent (September 2002) groundwater sampling event. The overall trends of the indicator compounds which demonstrate that natural attenuation is occurring, are shown on the figures presented in Appendix C (Figures 3 through 6). Figures 3 through 6 are plots of the "Theoretical Attenuation versus the Actual Concentrations" for the indicator compounds (PCE, TCE, vinyl chloride, and benzene). Natural attenuation at the Site is also confirmed on the "Least Squares Regression Analysis for Benzene," Figure 7 (Appendix C).

The extent of the contaminant plume is also decreasing in size over the five-year period. This trend is exhibited on the annual isoconcentration maps depicting maximum total volatile organics detected during the five-year period (Appendix D). As illustrated by the maps, the plume has decreased in size/aerial extent and concentration over the course of the five year period, most notably by the reduction and decrease in size of the number of wells exhibiting total VOC concentrations greater than 100 parts per billion.

8.0 ISSUES

There were no issues identified in the previous Five-Year Report. Table 2 summarizes those issues identified during this five-year review period based on the Site inspections.

Table 2: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Observed tree growth trying to establish around and on the cap.	N	Y
Stream staff gauges could not be read in recent sampling episodes.	N	N

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issues identified at the Site during Site inspections were summarized in Table 2 (Section 8.0). Table 3 addresses those issues and includes recommendations for follow-up actions.

Table 3: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Tree growth on and around cap.	Continue to inspect site and maintain accordingly to minimize any disturbance to cap by vegetative matter (most notably trees).	PRP	EPA	Annual	N	Y
Staff gauges not readable.	Prior to the September 2003 sampling event, make sure staff gauges properly annotated to account for drought levels in surface water bodies.	PRP	EPA	9/1/03	N	N

10.0 PROTECTIVENESS STATEMENT

OU 1 involved the construction of a water supply system to provide residents in the affected area with a permanent supply of safe drinking water. The water supply system has been in operation since September 1994. The remedy at OU 1 is protective of human health and the environment.

OU 2 involved the consolidation of contaminated soils to the cap area and construction of an impermeable barrier over the consolidated contaminated soils. The OU 2 remedy continues to minimize the continued release of contaminants to the groundwater and prevents public exposure to the contaminated soils. The remedy at OU 2 is protective of human health and the environment.

OU 3 relies on monitored natural attenuation of contaminated groundwater with a contingency for active pump and treat, and institutional controls to prevent the use of groundwater in the affected area . It was originally projected that natural attenuation would require 24 to 28 years to achieve the target cleanup concentrations. During the most recent sampling event in September 2002, three of the four indicator compounds were at or below the target concentrations, and the extent of the contaminant plume continues to decrease. The remedy at OU 3 is expected to be protective upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Because the remedial actions at all OUs at the Western Sand and Gravel Site are protective, the Site is protective of human health and the environment.

11.0 NEXT REVIEW

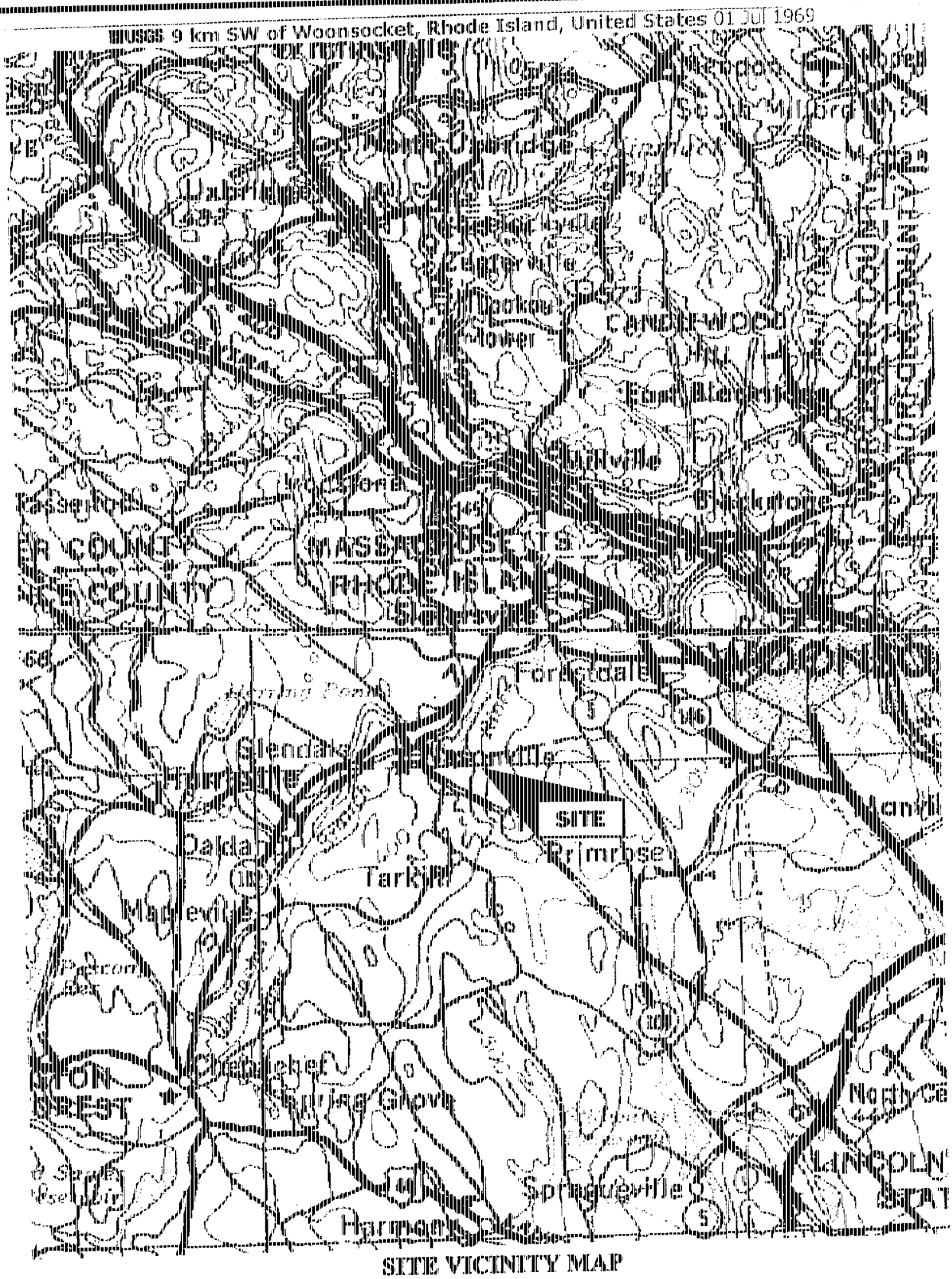
The next five-year review for the Site is required in September 2008, five years from the date of this review.

12.0 APPENDICES

Appendix A Site Map
Appendix B Tables Documenting Remedy Performance
Appendix C Figures Documenting Remedy Performance
Appendix D Annual Isoconcentration Maps
Appendix E Piezometric Data and Groundwater Flow Maps
Appendix F September 2002 Site Inspection Report
Appendix G Photographic Summary of Site Conditions

Appendix A

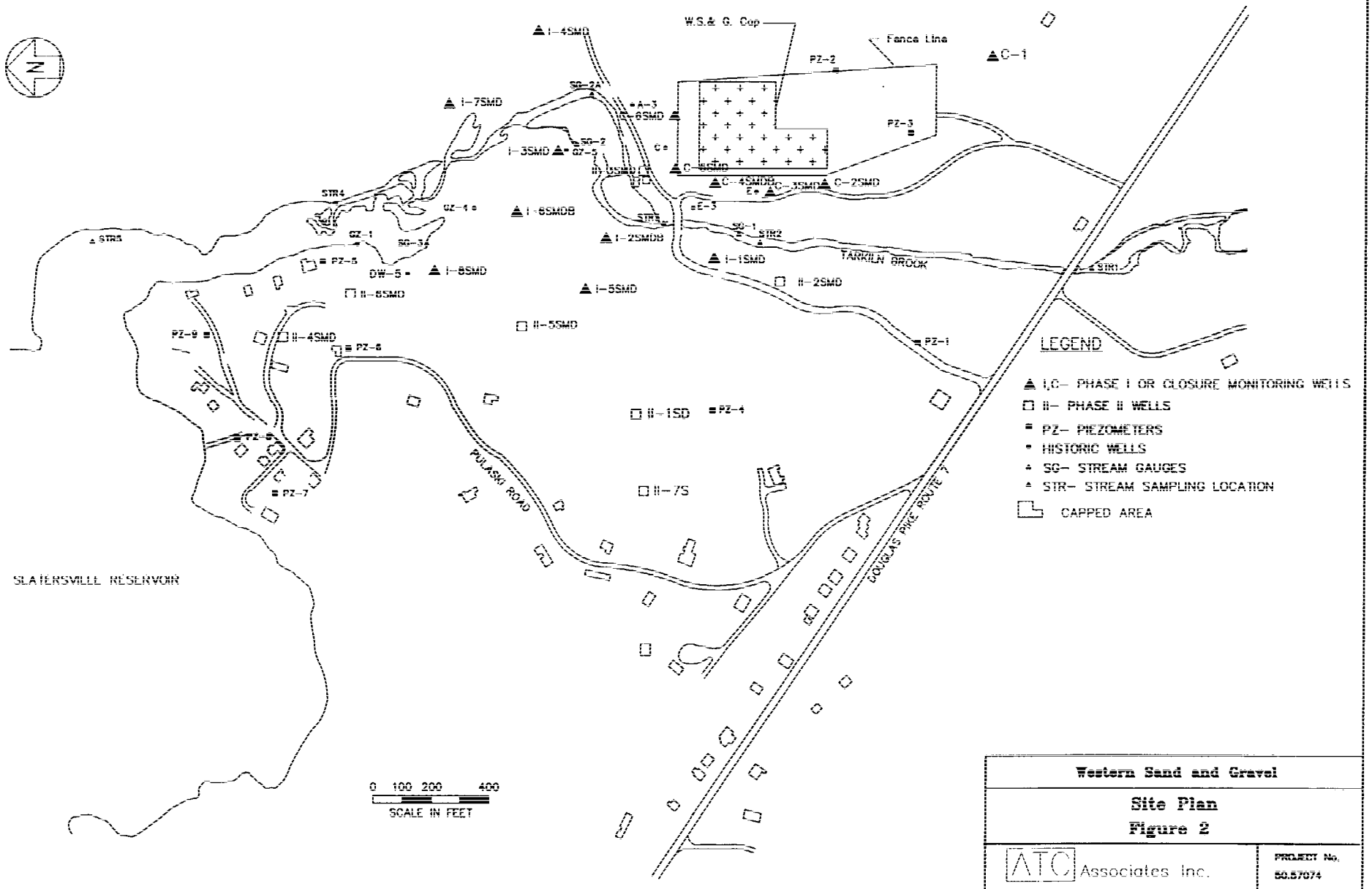
Site Map



SITE VICINITY MAP

Woonsocket, Rhode Island USGS 7.5 Min. Quadrangle Map Courtesy of U.S. Geological Survey/Terra Server SCALE: 1" = 2 miles	ATC ASSOCIATES INC	Western Sand and Gravel Site Burrillville, Rhode Island Figure 1 2003

Originals in color.



Western Sand and Gravel

Site Plan

Figure 2

ATC Associates Inc.

PROJECT No. 50.57074

Appendix B

Tables Documenting Remedy Performance

TABLE 1

SUMMARY OF DETECTED VOLATILE CONCENTRATIONS IN GROUNDWATER
WESTERN SAND AND GRAVEL SITE
BURRILLVILLE, RHODE ISLAND

	Notes, NA, ND, Source	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Mar-02	Sep-02
Location:																		
C1D				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	1.2	NA	NA	NA	ND	NA	NA	NA	ND	NA	ND
	Methylene Chloride	NA	NA	5.4U	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	ND
C2M				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	1.7J	NA	NA	NA	ND	NA	NA	NA	ND	NA	1.4U
	Methylene Chloride	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	8.4R
C2D				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1	NA	ND
C3S				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1	NA	NA	NA	ND	NA	ND
	Methylene Chloride	NA	NA	3U	NA	NA	NA	2.7U	NA	NA	NA	ND	NA	NA	NA	ND	NA	ND
C3M				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	2	NA	ND
	Xylenes	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1.8	NA	ND
	Methylene Chloride	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	9.2BR
C4S		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Benzene	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Toluene	14	14	ND	ND	71D	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Chlorobenzene	ND	ND	ND	ND	9.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ethylbenzene	10	4.9	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Xylenes	22	5.6	ND	ND	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.70	ND	ND	ND	ND
	Vinyl Chloride	14	1.6J	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	1.3J	ND	ND	ND
	1,1-Dichloroethene	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Methylene Chloride	10U	2.4UJ	ND	ND	ND	2.9U	ND	ND	ND	7.2U	3.2BUJ	ND	1.1UJ	ND	ND	2.4U	ND
	trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8J	ND	ND

TABLE 1

SUMMARY OF DETECTED VOLATILE CONCENTRATIONS IN GROUNDWATER

WESTERN SAND AND GRAVEL SITE

BURRILLVILLE, RHODE ISLAND

	Notes, NA, ND, Source	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Mar-02	Sep-02
Location:																		
(C4S)	1,1-Dichloroethane	16	24J	12	1.6	8.8	16J	3.8	7.2	6.3	14J	6.5J	2	4.3	23	14J	1.2	4.1
	cis-1,2-Dichloroethene	21	110DJ	98D	11	25	130D	11	41D	41D	140DJ	43DJ	4	ND	170D	94D	5.1	8.3
	Chloroform	1.4	2.8J	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	31D	ND	ND	ND	ND
	1,1,1-Trichloroethane	84D	74DJ	30	7.7	ND	25J	17	11	7.9	23DJ	14J	6	3.9	44D	20J	2.5	12
	Trichloroethene	4.1	8.9J	4.8	ND	3.8	5.6J	1.3	2.6	1.2	3.7J	1.6J	0.7J	1.4	8.5	3.4J	ND	ND
	Tetrachloroethene	11	15J	15	1.6	8.8	15J	1.5	4.9	5.2	15J	5.5J	1	4.7	22	14J	2.3	ND
C4M		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Toluene	ND	ND	ND	ND	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Xylenes	ND	ND	ND	ND	2.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Methylene Chloride	7.5U	ND	ND	1.4U	ND	ND	ND	5.6U	ND	17U	ND	ND	1.1UJ	ND	ND	4.1BU	ND
C4D		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.1U	ND	ND	ND	ND
	Chlorobenzene	6.2	4	9.3	9.8J	8.4	5.8	5.9J	4.1	3.4	2.4	2.4	4	2.9	1.2	5.5	5.9J	3.1
	Ethylbenzene	ND	ND	1.3	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Vinyl Chloride	1.1	ND	ND	ND	1.1	ND	ND	ND	ND	ND	ND	0.6J	ND	ND	ND	ND	ND
	Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6J	ND	ND	ND	ND	3.6BU	ND
	1,1-Dichloroethane	2.1	1.4J	2.2	2.3	2.6	2	1.8J	ND	1.2	ND	ND	1	ND	ND	1.1	ND	ND
C5S		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Methylene Chloride	ND	ND	ND	58	ND	2.2U	ND	ND	ND	ND	ND	ND	1.3UJ	ND	ND	ND	ND
	trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	1.3	ND	1.3	ND	ND
	1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	1.4	ND	ND	ND	ND
	1,1-Dichloroethane	10	ND	1.6	ND	16	9	34J	20D	12	3.9	8.1J	48	40EJ	17J	14	140J	22
	cis-1,2-Dichloroethene	37	5.8J	8.9	120	80D	23	130J	110D	33D	14	23J	160	170D	64D	45D	640DJ	78D
	Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	2.8J	ND	ND	ND	ND
	Chloroform	1.5	ND	ND	18	1.7	0.97	4.1J	2.8	1.2	ND	0.79J	1	6.3	2J	1.6	13J	3.4UJ
	1,1,1-Trichloroethane	29	13J	13	59	35D	31D	75J	61D	44D	23D	29DJ	94	54D	49D	42D	210J	58D
	Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.56	ND	ND	ND	ND
	Trichloroethene	1.9	ND	ND	ND	4	1.7	5.8J	4.8	2.7	ND	1.3	5	7.2	2.7J	1.9	15	2.8
	Tetrachloroethene	1.8	ND	0.87	ND	3.1	1.7	3.8J	2.9	2.6	0.75	1.7	3	4.3	2.4J	2.3	5.8J	2.5

TABLE 1

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	Notes, NA, ND, Source	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Mar-02	Sep-02
Location:																		
C5M		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Benzene	ND	ND	0.96	ND	ND	1.4	8.4	2	1.4J	ND	4.7	6	4.8	2.7	5.8	4	ND
	Toluene	6.9	1.3	100	230	1.9	100D	350J	160D	110D	16J	220D	240	210D	330DJ	460DJ	230D	1.8U
	Chlorobenzene	1.1J	ND	9	25	ND	14	61J	16	13	2.1	34D	45	41D	32J	53D	35DJ	2.7
	Ethylbenzene	1.2	ND	11	40	ND	18	100	23	20J	3J	56D	90	65D	42J	78D	53D	1.9
	Xylenes	3.7	ND	32	106	ND	47	240J	62	56JD	8J	140D	NA	160D	130J	240DJ	130D	2.2
	1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	0.82	ND	ND	ND	ND	ND	0.63J	ND	0.76	ND	ND
	1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	3.3	1.7	1.3	ND	1.8DJ	2	1.9	1.3J	2.9	2.1	ND
	Vinyl Chloride	ND	ND	ND	ND	ND	ND	6.4	ND	ND	ND	7.1	3	3.4J	ND	4	2.1	ND
	1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	1	ND	3.2	1.1	ND
	Methylene Chloride	ND	ND	ND	ND	ND	2.8U	2.6U	ND	ND	ND	6.6DU	ND	1.2UJ	10	ND	ND	ND
	1,1-Dichloroethane	ND	ND	4.4	ND	ND	6	21J	7.5	4.6J	ND	14D	15	13	12J	16J	11	7.2
	cis-1,2-Dichloroethene	ND	ND	13	25	ND	11	25J	27	15	4.1	35D	24	20	52J	85D	35D	ND
	Chloroform	ND	ND	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.4	0.91	ND	ND
	1,1,1-Trichloroethane	ND	ND	1.2	ND	ND	ND	2.1J	ND	ND	ND	ND	1	1.2	ND	2.8	0.83	ND
	1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	1.6J	ND	ND	ND	ND	2	1.2	ND	2	ND	ND
	Trichloroethene	ND	ND	4.6	ND	ND	2.7	0.65J	ND	ND	ND	ND	ND	ND	5	ND	ND	ND
	Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND	ND
	1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	0.81J	ND	ND	ND	ND	ND	ND	ND	0.51	ND	ND
	1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	3.2J	ND	ND	ND	ND	ND	1.9	ND	2.8	ND	ND
C5D		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2U	ND	ND	ND	ND
	Methylene Chloride	ND	2.6UJ	ND	ND	ND	1.1U	ND	ND	ND	ND	ND	ND	1.1UJ	ND	ND	2.5U	ND
	1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C6S		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Methylene Chloride	ND	2.4UJ	ND	4.4U	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6BU	2.7BR
C6M		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND
	Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	2U	ND	ND	ND	ND	ND	2.6BU	ND

TABLE 1

SUMMARY OF DETECTED VOLATILE CONCENTRATIONS IN GROUNDWATER

WESTERN SAND AND GRAVEL SITE

BURRILLVILLE, RHODE ISLAND

	Notes, NA, ND, Source	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Mar-02	Sep-02
Location:																		
C6D		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Toluene	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4U	ND	ND	ND	ND
	Methylene Chloride	ND	ND	ND	2U	ND	ND	ND	ND	ND	ND	ND	ND	1.7BUJ	ND	ND	3.9BU	ND
I1D				X				X				X						
	Trichloroethene	NA	NA	4.8	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
	Tetrachloroethene	NA	NA	15	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
I2D				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1.1	NA	ND
I3S				X				X				X				X		X
	Vinyl Chloride	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	1.2
	trans-1,2-Dichloroethene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	10	NA	ND
	cis-1,2-Dichloroethene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	5
I3D				X				X				X				X		X
	Chlorobenzene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	0.51	NA	ND
	1,2-Dichlorobenzene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	0.52J	NA	NA	NA	ND	NA	ND
	1,1-Dichloroethane	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1.1	NA	NA	NA	1.1J	NA	ND
	cis-1,2-Dichloroethene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1.3	NA	NA	NA	1.3J	NA	ND
	Trichloroethene	NA	NA	0.84	NA	NA	NA	0.81	NA	NA	NA	1.5	NA	NA	NA	1.4J	NA	1.1J
	Tetrachloroethene	NA	NA	0.57	NA	NA	NA	ND	NA	NA	NA	0.54	NA	NA	NA	ND	NA	ND
I4M								X								X		
		NA	NA	NA	NA	NA	NA	0.78	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA
I4D								X								X		
	Tetrachloroethene	NA	NA	NA	NA	NA	NA	0.51	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA

TABLE 1

SUMMARY OF DETECTED VOLATILE CONCENTRATIONS IN GROUNDWATER

WESTERN SAND AND GRAVEL SITE

BURRILLVILLE, RHODE ISLAND

	Notes, NA, ND, Source	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Mar-02	Sep-02
Location:																		
I6S				X				X				X				X		X
	Methylene Chloride	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	2.8R
	Chloroform	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	1.1
I6M				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	1.2U	NA	ND
I6D				X				X				X				X		X
	Toluene	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA	NA	ND	NA	1
I7D								X				X				X		
	Tetrachloroethene	NA	NA	NA	NA	NA	NA	1.2	NA	NA	NA	ND	NA	NA	NA	ND	NA	NA
II2M				X				X				X						
	Methylene Chloride	NA	NA	ND	NA	NA	NA	5.5U	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
II2D				X				X				X						
	Methylene Chloride	NA	NA	ND	NA	NA	NA	1.2U	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
II3S		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Benzene	ND	ND	11	ND	ND	16	ND	0.74	ND	ND	ND	ND	ND	1.4	ND	ND	ND
	Toluene	ND	ND	ND	ND	4.4	ND	ND	ND	1.2J	ND	ND	ND	ND	ND	ND	ND	ND
	Chlorobenzene	ND	ND	5.4	ND	0.84	2	ND	ND	0.55J	9	ND	ND	ND	56D	ND	ND	ND
	Ethylbenzene	ND	ND	27	ND	4.5	90D	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Xylenes	ND	ND	82	ND	3.6	97D	ND	ND	ND	ND	ND	ND	ND	17	ND	ND	ND
	1,2-Dichlorbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.8J	ND	ND	ND	ND	ND	ND	ND
	Vinyl Chloride	ND	ND	2.4J	ND	8.5	3	ND	ND	2.3J	3.1	ND	ND	ND	23J	ND	ND	ND
	1,1-Dichloroethene	ND	ND	2.8J	ND	ND	4.7	ND	1.3	ND	ND	ND	ND	ND	3.9J	1.2	ND	ND
	Methylene Chloride	ND	1.4UJ	3.5U	91	1.4	1.2U	ND	ND	2.3U	ND	ND	ND	1.8BUJ	2.2U	ND	2.8BU	ND
	trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1J	ND	ND	ND
	1,1-Dichloroethane	12	4.9J	45D	ND	60D	52D	3.5J	15	11	20D	11	5	4.9	44D	35D	4.2	1.8
	cis-1,2-Dichloroethene	68D	21J	180D	14	400D	150D	22J	45D	54D	47D	64D	9	14	110D	110D	15	13

TABLE 1

SUMMARY OF DETECTED VOLATILE CONCENTRATIONS IN GROUNDWATER

WESTERN SAND AND GRAVEL SITE

BURRILLVILLE, RHODE ISLAND

	Notes, NA, ND, Source	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Mar-02	Sep-02
Location:																		
(II3S)	Chloroform	2.1	0.68J	3.7J	ND	8.8	3.4	ND	1	1.1	1.8	ND	ND	ND	4.2J	2.3	ND	ND
	1,1,1-Trichloroethane	21	16J	160D	25	97D	190D	5.1J	51D	20	82D	24	15	11	93D	78D	9.4	1.7
	Trichloroethene	1.9	0.54J	11J	ND	12	18	0.98J	2.6	2	2.4J	2.7	1	1	4.7J	6.5	0.6	ND
	Tetrachloroethene	1.3	ND	20J	ND	7.7	18	2.3J	4	5.4	2.3	8.2	2	2.7	5.7J	13	2.5	1.6
II3M		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Benzene	ND	1.8	1.7	ND	ND	ND	ND	ND	ND	0.59	ND	ND	ND	ND	0.51	ND	ND
	Toluene	4.6	94	ND	ND	6.7	ND	ND	ND	4.8	ND	ND	ND	ND	ND	2.6	ND	ND
	Chlorobenzene	2.3J	21J	120D	12J	2.4J	5.8	2.7	5.1	6	4.1	1.8	0.7J	1.1	ND	7.4	3.1J	ND
	Ethylbenzene	2.4	18	17	4.8	2.7	1.4	ND	2.5	3.4	1.8	ND	ND	ND	ND	1.3	ND	ND
	Xylenes	ND	42	9.4	2.3	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9	ND	ND
	1,2-Dichlorobenzene	ND	0.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Vinyl Chloride	ND	ND	4.4	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.8BUJ	ND	ND	3.4BU	ND
	1,1-Dichloroethane	ND	11J	31D	5.9	ND	2.7	ND	5.8	5.7	4.1	ND	0.6J	ND	ND	1.9	ND	ND
	1,2-Dichloropropane	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
II3D		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Toluene	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2U	ND	1.6	ND	ND
	Chlorobenzene	1.4J	0.67	0.82	2.5J	1.1J	ND	1.8	1.4	0.95	0.68	1.3	2	1.2U	0.72	0.96	2J	2.3
	Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.1BUJ	ND	ND	ND	ND
	1,1-Dichloroethane	ND	ND	ND	1.6	ND	ND	1.3	ND	ND	ND	1.4	2	1.3	ND	ND	ND	1
	Trichloroethene	ND	0.54UJ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
II5S								X										
	Methylene Chloride	NA	NA	NA	NA	NA	NA	4.5U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
II5M								X										
	Methylene Chloride	NA	NA	NA	NA	NA	NA	4.7U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
II6D								X										
	Methylene Chloride	NA	NA	NA	NA	NA	NA	2.4U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 1 (Cont'd)

SUMMARY OF DETECTED SEMIVOLATILE CONCENTRATIONS IN GROUNDWATER
WESTERN SAND AND GRAVEL SITE
BURRILLVILLE, RHODE ISLAND

		Sep-95	Sep-91
Location:			
I2S			
	Diethylphthalate	0.1J	ND
	Di-n-Butylphthalate	0.2JB	ND
	bis(2-ethylhexyl)phthalate	0.2J	50BJ
I2M			
	Diethylphthalate	0.1J	ND
	Di-n-Butylphthalate	0.2JB	ND
	bis(2-ethylhexyl)phthalate	0.2J	32BJ
I2D			
	Diethylphthalate	0.1J	ND
	Di-n-Butylphthalate	0.2JB	ND
	bis(2-ethylhexyl)phthalate	0.2J	50BJ
I3S			
	bis(2-ethylhexyl)phthalate	ND	26BJ
I3M			
	bis(2-ethylhexyl)phthalate	0.1J	0.8 10U
I3D			
	Diethylphthallate	0.7J	ND
	Di-n-butylphthalate	0.09JB	1J
	bis(2-ethylhexyl)phthalate	0.3J	2 10U
II3S			
	bis(2-ethylhexyl)phthalate	ND	1 (10U)
II3M			
	bis(2-ethylhexyl)phthalate	ND	60BJ
	Isophorone	0.2J	ND
II3D			
	bis(2-ethylhexyl)phthalate	ND	5 (10U)
	Diethylphthalate	0.2J	ND
C2S			
	bis(2-ethylhexyl)phthalate	ND	1 (10U)
C2M			
	Diethylphthalate	0.1J	2J

TABLE 1 (Cont'd)

SUMMARY OF DETECTED SEMIVOLATILE CONCENTRATIONS IN GROUNDWATER

WESTERN SAND AND GRAVEL SITE

BURRILLVILLE, RHODE ISLAND

		3-Jul-95	Sep-91
Location:			
	Di-n-butylphthalate	0.2JB	ND
	bis(2-ethylhexyl)phthalate	0.2J	1 (10U)
C2D			
	bis(2-ethylhexyl)phthalate	ND	0.8 (10U)
C3S			
	bis(2-ethylhexyl)phthalate	ND	5 (10U)
C3M			
	Diethylphthalate	0.5J	ND
	Di-n-butylphthalate	2JB	ND
	bis(2-ethylhexyl)phthalate	1J	3 (10U)
C3D			
	Di-n-butylphthalate	ND	0.7J
	bis(2-ethylhexyl)phthalate	ND	25BJ
C4S			
	bis(2-ethylhexyl)phthalate	ND	6 (10U)
	Di-n-butylphthalate	ND	1J
C4M			
	bis(2-ethylhexyl)phthalate	ND	2 (10U)
C4D			
	bis(2-ethylhexyl)phthalate	ND	1 (10U)
C5S			
	bis(2-ethylhexyl)phthalate	ND	1 (10U)
C5M			
	Phenol	54	55
	1,4-Dichlorobenzene	0.6J	ND
	1,2-Dichlorobenzene	2J	ND
	2-Methylphenol	4J	3J
	Acetophenone	NA	1J
	4-Methylphenol	74	70
	Isophorone	3J	4J
	2,4-Dimethylphenol	9J	3J
	2,4-Dichlorophenol	1J	1J
	Naphthalene	2J	0.7J

TABLE 1 (Cont'd)

SUMMARY OF DETECTED SEMIVOLATILE CONCENTRATIONS IN GROUNDWATER
WESTERN SAND AND GRAVEL SITE
BURRILLVILLE, RHODE ISLAND

		Sep-99	Sep-01
Location:			
	Caprolactam	ND	0.9R
	4-Chloro-3-Methylphenol	2J	0.9J
	2-Methylnaphthalene	0.6J	ND
	Diethylphthalate	0.4J	ND
	bis(2-ethylhexyl)phthalate	0.4J	4 (10U)
	Di-n-butylphthalate	0.2J	ND
C5D			
	bis(2-ethylhexyl)phthalate	ND	2 (10U)
C6S			
	bis(2-ethylhexyl)phthalate	ND	2 (10U)
C6M			
	bis(2-ethylhexyl)phthalate	ND	47BJ
C6D			
	bis(2-ethylhexyl)phthalate	ND	2 (10U)

Notes:
For duplicate samples, the highest concentration is given.
Units - micrograms per liter (ug/l)
ND - Not detected
Semivolatiles were not analyzed in 1998, 2000 and 2002.
1 (10U) - estimated value detected below detection limit (10).

TABLE 1 (Cont'd)

SUMMARY OF DETECTED METALS IN GROUNDWATER
WESTERN SAND AND GRAVEL SITE
BURRILLVILLE, RHODE ISLAND

SEPTEMBER 1999

	C2S	C2M	C22M Dup	C2D	C3S	C3M	C3D	C4S	C4M	C4D	C5S	C5M	C55M Dup	C5D	C6S	C6M	C6D	I2S	I2M	I2D	I3S	I3M	I3D	I6S	I6M	I6D
Aluminum	0.955	0.0514 U	0.0548 U	0.0594 U	0.404 U	0.0707 U	0.104 U	0.492	0.0757 U	0.0987 U	1.34	1.34	1.26	0.196 U	6.72	0.116 U	0.102 U	1.05	0.0568 U	0.0335 U	0.295 U	0.0555 U	0.062 U	5.87	0.0721 U	0.108 U
Barium	0.0418	0.0176	0.0179	0.0186	0.0347	0.0207	0.0209	0.0398	0.0202	0.0188	0.0639	0.0603	0.0576	0.0659	0.108	0.0072	0.0065	0.0324	0.0323	0.0122	0.008	0.0106	0.0104	0.0874	0.014	0.0047
Cobalt	0.0016 U	--	0.001 U	--	--	--	0.0014 U	--	--	0.001 U	--	0.0172	0.0146	--	0.011	--	--	0.0016 U	--	0.0014 U	0.0024 U	--	0.0013 U	0.0054	--	--
Copper	0.0016	0.0021	--	--	--	--	--	0.0062	--	0.0073	0.0045	0.008	0.0084	--	0.0035	0.009	--	0.0014	0.001	0.0018	--	0.0014	0.0121	0.0094	0.0015	0.0016
Lead	0.0027	--	--	--	0.0011	--	--	0.0023	--	--	--	0.0022 J	0.0021 J	--	0.0172	0.009	--	0.0032	--	--	--	--	--	--	--	--
Nickel	0.002	0.0085	--	--	--	--	--	0.0041	0.0032	0.0025	0.0058	0.0069	0.0039	--	0.0143	0.0049	--	0.002	0.0022	0.0026	0.0025	0.0099	--	0.0053	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	0.266 J	0.284 J	0.19 J	0.223 J	0.268 J	0.325 J	0.0850 J	0.118 J	0.0631 J	0.135 J	0.0119	0.0123	0.0197	--	0.262 J	0.148 J	0.256 J	0.122 J	0.41 J	0.439 J	0.0771 J	0.117 J	0.146 J	0.0302	0.0152	--

SEPTEMBER 2001

	I6S	I6M	I6D	I-2S	I-2M	I-2D	C-6S	C-6M	C-6D	I-3S	I-3M	I-3D	I-33D Dup	C2S	C2M	C2D	C5S	C5M	C5D	C4S	C4M	C4D	C6S	C6M	C6D	C66D Dup
Aluminum	0.208 J	0.133 J	0.0269 J	0.136 J	0.042 J	0.0937 J	17.7	0.0379 J	0.0822 J	0.0319 J	0.522	0.0894 J	0.0825 J	0.217 J	0.0864 J	0.0396 J	0.0481 J	0.0481 J	0.0542 J	0.0277 J	0.0353 J	--	0.0814 J	1.14	--	0.027 J
Barium	0.0061	0.0111	0.0112	0.0129	0.0224	0.0158	0.112	0.0049	0.0064	0.0362	0.0197	0.0075	0.0064	0.0439	0.0345	0.0329	0.0406	0.0344	0.0323	0.0352	0.0351	0.0576	0.0577	0.0563	0.0053	0.0054
Cobalt	--	--	--	--	--	--	0.0068 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0126 J	--	--
Copper	--	--	0.0029 J	--	0.0017 J	0.0022 J	0.0056 J	--	--	0.0153 J	0	0.0031	0.0025	0.0106 J	0.0037 J	0.0017 J	--	0.0022 J	0.0017 J	0.0029 J	0.0057 J	0.0075 J	--	0.0056 J	--	--
Lead	0.0019 J	--	--	0.0023 J	0.0018 J	0.0017 J	0.0073 U	0.0023 J	--	--	0.0031 J	0.0025 J	--	0.003 U	0.0016 U	0.0026 U	0.0024 U	--	0.0016 U	0.0026 U	--	--	--	0.0047 U	0.002 U	--
Nickel	--	--	0.006 U	--	--	0.0055 U	0.0175 U	0.0063 U	--	--	--	--	--	0.0074 J	--	--	--	--	0.0106 J	--	--	0.014 U	0.0172 U	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	0.0058 U	0.007 U	0.0134 U	0.0077 U	0.0071 U	0.0137 U	0.0551 U	0.0103 U	0.0098 U	0.0101 U	0.0093 U	0.0057 U	0.0062 U	0.0061 U	0.0248 U	0.0017 U	0.0042 U	0.0045 U	0.0034 U	0.0063 U	0.0026 U	0.0078 U	0.0024 U	0.0075 U	0.0021 U	0.0071 U

J - Denotes an estimated value less than the contract required quantitation limit (CRQL) or exceeding QC criteria.

U - Questionable qualitative value due to blank contamination. Reported results have been changed to reflect an adjusted quantitation limit.

All concentrations in units of micrograms per kilogram (mg/kg).

WILCOXON SIGNED RANK TEST FOR BENZENE
Target Concentration - 5.0 ppb

Sampling Month	x	Theoretical Concentration (ppb)	Actual Maximum Concentration (ppb)	Y_i	Absolute Value Y_i	R_i	W_i	$(R_i)(W_i)$
September-89	-18	34.0	34.0	0.0	0	1	0	0
August-90	-7	24.8	13.0	-11.8	11.8	41	0	0
November-90	-4	22.8	19.0	-3.8	3.8	24	0	0
September-91	6	17.2	3.0	-14.2	14.2	43	0	0
December-91	9	15.8	28.5	12.7	12.7	42	1	42
June-92	15	13.3	5.0	-8.3	8.3	38	0	0
September-92	18	12.2	21.0	8.8	8.8	39	1	39
December-92	21	11.2	5.5	-5.7	5.7	34	0	0
March-93	24	10.3	4.0	-6.3	6.3	36	0	0
June-93	27	9.5	59.0	49.5	49.5	45	1	45
September-93	30	8.7	1.4	-7.3	7.3	37	0	0
December-93	33	8.0	5.2	-2.8	2.8	17	0	0
March-94	36	7.3	2.0	-5.3	5.3	33	0	0
June-94	39	6.7	23.0	16.3	16.3	44	1	44
September-94	42	6.2	6.6	0.4	0.4	6	1	6
December-94	45	5.7	5.5	-0.2	0.2	4	0	0
March-95	48	5.2	2.8	-2.4	2.4	15	0	0
June-95	51	5.0	5.1	0.1	0.1	2	1	2
September-95	54	5.0	1.1	-3.9	3.9	25	0	0
December-95	57	5.0	9.9	4.9	4.9	31	1	31
March-96	60	5.0	1.4	-3.6	3.6	23	0	0
June-96	63	5.0	7.4	2.4	2.4	14	1	14
September-96	66	5.0	10.0	5.0	5.0	32	1	32
December-96	69	5.0	0.3	-4.7	4.7	30	0	0
March-97	72	5.0	2.2	-2.8	2.8	16	0	0
June-97	75	5.0	2.9	-2.1	2.1	12	0	0
September-97	78	5.0	8.1	3.1	3.1	20	1	20
December-97	81	5.0	3.2	-1.8	1.8	10	0	0
March-98	84	5.0	3.0	-2.0	2.0	11	0	0
June-98	87	5.0	1.9	-3.1	3.1	21	0	0
September-98	90	5.0	11.0	6.0	6.0	35	1	35
December-98	93	5.0	0.5	-4.5	4.5	27	0	0
March-99	96	5.0	0.5	-4.5	4.5	27	0	0
June-99	99	5.0	16.0	11.0	11.0	40	1	40
September-99	102	5.0	8.4	3.4	3.4	22	1	22
December-99	105	5.0	2.0	-3.0	3.0	18	0	0
March-00	108	5.0	2.0	-3.0	3.0	18	0	0
June-00	111	5.0	0.6	-4.4	4.4	26	0	0
September-00	114	5.0	4.7	-0.3	0.3	5	0	0
December-00	117	5.0	6.0	1.0	1.0	8	1	8
March-01	120	5.0	4.9	-0.1	0.1	2	0	0
June-01	123	5.0	2.7	-2.3	2.3	13	0	0
September-01	126	5.0	5.8	0.8	0.8	7	1	7
March-02	132	5.0	4.0	-1.0	1.0	8	0	0
September-02	138	5.0	0.5	-4.5	4.5	27	0	0

Signed Rank Test Passed Since $T^+ = \text{Sum}(R_i)(W_i) =$ 387

$T^+ < t(\alpha,n)$ $t(\alpha,n) =$ 664

WILCOXON SIGNED RANK SUM TEST FOR TETRACHLOROETHENE (PCE)
Target Concentration - 5.0 ppb

Sampling Month	x	Theoretical Concentration (ppb)	Actual Maximum Concentration (ppb)	Y_i	Absolute Value Y_i	R_i	W_i	$(R_i)(W_i)$
February-89	-25	64.0	64.0	0.0	0.0	1	0	0
September-89	-18	60.5	25.0	-35.5	35.5	42	0	0
August-90	-7	55.5	21.0	-34.5	34.5	41	0	0
November-90	-4	54.2	23.0	-31.2	31.2	39	0	0
September-91	6	50.2	10.0	-40.2	40.2	46	0	0
December-91	9	49.0	9.0	-40.0	40.0	45	0	0
February-92	11	48.2	17.0	-31.2	31.2	38	0	0
June-92	15	46.7	18.0	-28.7	28.7	36	0	0
September-92	18	45.7	8.2	-37.5	37.5	43	0	0
December-92	21	44.6	4.9	-39.7	39.7	44	0	0
March-93	24	43.6	22.0	-21.6	21.6	22	0	0
June-93	27	42.6	19.0	-23.6	23.6	26	0	0
September-93	30	41.6	1.3	-40.3	40.3	47	0	0
December-93	33	40.6	12.0	-28.6	28.6	35	0	0
March-94	36	39.7	10.0	-29.7	29.7	37	0	0
June-94	39	38.7	17.0	-21.7	21.7	23	0	0
September-94	42	37.8	15.0	-22.8	22.8	24	0	0
December-94	45	37.0	5.1	-31.9	31.9	40	0	0
March-95	48	36.1	8.8	-27.3	27.3	33	0	0
June-95	51	35.3	8.0	-27.3	27.3	32	0	0
September-95	54	34.4	9.0	-25.4	25.4	30	0	0
December-95	57	33.6	6.4	-27.2	27.2	31	0	0
March-96	60	32.9	13.0	-19.9	19.9	21	0	0
June-96	63	32.1	20.0	-12.1	12.1	9	0	0
September-96	66	31.4	7.4	-24.0	24.0	29	0	0
December-96	69	30.6	2.8	-27.8	27.8	34	0	0
March-97	72	29.9	17.0	-12.9	12.9	11	0	0
June-97	75	29.2	19.0	-10.2	10.2	7	0	0
September-97	78	28.5	5.2	-23.3	23.3	25	0	0
December-97	81	27.9	4.3	-23.6	23.6	27	0	0
March-98	84	27.2	11.0	-16.2	16.2	16	0	0
June-98	87	26.6	15.0	-11.6	11.6	8	0	0
September-98	90	26.0	20.0	-6.0	6.0	4	0	0
December-98	93	25.4	1.6	-23.8	23.8	28	0	0
March-99	96	24.8	8.8	-16.0	16.0	15	0	0
June-99	99	24.2	18.0	-6.2	6.2	5	0	0
September-99	102	23.7	3.8	-19.9	19.9	20	0	0
December-99	105	23.1	4.9	-18.2	18.2	19	0	0
March-00	108	22.6	5.4	-17.2	17.2	17	0	0
June-00	111	22.0	15.0	-7.0	7.0	6	0	0
September-00	114	21.5	8.2	-13.3	13.3	12	0	0
December-00	117	21.0	3.0	-18.0	18.0	18	0	0
March-01	120	20.5	4.7	-15.8	15.8	14	0	0
June-01	123	20.1	22.0	1.9	1.9	2	1	2
September-01	126	19.6	14.0	-5.6	5.6	3	0	0
March-02	132	18.7	5.8	-12.9	12.9	10	0	0
September-02	138	17.8	2.5	-15.3	15.3	13	0	0

Signed Rank Test Passed Since $T^+ = \text{Sum}(R_i)(W_i) =$ 2

$T^+ < t(\alpha,n)$ $t(\alpha,n) =$ 720

WILCOXON SIGNED RANK SUM TEST FOR TRICHLOROETHENE (TCE)
Target Concentration - 5.0 ppb

Sampling Month	x	Theoretical Concentration (ppb)	Actual Maximum Concentration (ppb)	Y_i	Absolute Value Y_i	R_i	W_i	$(R_i)(W_i)$
February-89	-25	200.0	200.0	0.0	0.0	1	0	0
September-89	-18	173.5	57.0	-116.5	116.5	46	0	0
August-90	-7	138.8	16.0	-122.8	122.8	47	0	0
November-90	-4	130.6	23.0	-107.6	107.6	45	0	0
September-91	6	106.7	11.0	-95.7	95.7	44	0	0
December-91	9	100.4	8.0	-92.4	92.4	43	0	0
February-92	11	96.4	12.0	-84.4	84.4	42	0	0
June-92	15	88.9	17.0	-71.9	71.9	39	0	0
September-92	18	83.6	10.8	-72.8	72.8	41	0	0
December-92	21	78.7	6.5	-72.2	72.2	40	0	0
March-93	24	74.1	30.0	-44.1	44.1	36	0	0
June-93	27	69.7	39.0	-30.7	30.7	31	0	0
September-93	30	65.6	9.7	-55.9	55.9	38	0	0
December-93	33	61.7	34.0	-27.7	27.7	30	0	0
March-94	36	58.1	11.0	-47.1	47.1	37	0	0
June-94	39	54.7	19.0	-35.7	35.7	33	0	0
September-94	42	51.4	27.0	-24.4	24.4	25	0	0
December-94	45	48.4	4.9	-43.5	43.5	35	0	0
March-95	48	45.5	8.0	-37.5	37.5	34	0	0
June-95	51	42.9	12.0	-30.9	30.9	32	0	0
September-95	54	40.3	17.0	-23.3	23.3	24	0	0
December-95	57	37.9	12.0	-25.9	25.9	28	0	0
March-96	60	35.7	11.0	-24.7	24.7	26	0	0
June-96	63	33.6	13.0	-20.6	20.6	21	0	0
September-96	66	31.6	4.8	-26.8	26.8	29	0	0
December-96	69	29.8	4.1	-25.7	25.7	27	0	0
March-97	72	28.0	10.0	-18.0	18.0	20	0	0
June-97	75	26.4	13.0	-13.4	13.4	17	0	0
September-97	78	24.8	3.3	-21.5	21.5	22	0	0
December-97	81	23.3	1.0	-22.3	22.3	23	0	0
March-98	84	22.0	4.1	-17.9	17.9	19	0	0
June-98	87	20.7	8.9	-11.8	11.8	16	0	0
September-98	90	19.4	11.0	-8.4	8.4	10	0	0
December-98	93	18.3	0.5	-17.8	17.8	18	0	0
March-99	96	17.2	12.0	-5.2	5.2	7	0	0
June-99	99	16.2	18.0	1.8	1.8	3	1	3
September-99	102	15.2	5.8	-9.4	9.4	13	0	0
December-99	105	14.3	4.8	-9.5	9.5	14	0	0
March-00	108	13.5	2.5	-11.0	11.0	15	0	0
June-00	111	12.7	3.7	-9.0	9.0	11	0	0
September-00	114	12.0	2.7	-9.3	9.3	12	0	0
December-00	117	11.3	5.0	-6.3	6.3	8	0	0
March-01	120	10.6	7.2	-3.4	3.4	5	0	0
June-01	123	10.0	8.5	-1.5	1.5	2	0	0
September-01	126	9.4	6.5	-2.9	2.9	4	0	0
March-02	132	8.3	15.0	6.7	6.7	9	1	9
September-02	138	7.4	2.8	-4.6	4.6	6	0	0

Signed Rank Test Passed Since $T^+ =$ Sum$(R_i)(W_i) =$ 12

$T^+ < t(\alpha,n)$ $t(\alpha,n) =$ 720

WILCOXON SIGNED RANK SUM TEST FOR VINYL CHLORIDE
Target Concnetration - 2.0 ppb

Sampling Month	x	Theoretical Concentration (ppb)	Actual Maximum Concentration (ppb)	Y_i	Absolute Value Y_i	R_i	W_i	$(R_i)(W_i)$
February-89	-25	430.0	430.0	0.0	0.0	1	0	0
September-89	-18	329.9	160.0	-169.9	169.9	47	0	0
August-90	-7	217.8	88.0	-129.8	129.8	45	0	0
November-90	-4	194.4	64.0	-130.4	130.4	46	0	0
September-91	6	133.3	43.5	-89.8	89.8	43	0	0
December-91	9	119.0	90.5	-28.5	28.5	29	0	0
February-92	11	110.4	11.0	-99.4	99.4	44	0	0
June-92	15	94.9	19.0	-75.9	75.9	42	0	0
September-92	18	84.7	53.0	-31.7	31.7	31	0	0
December-92	21	75.6	2.0	-73.6	73.6	41	0	0
March-93	24	67.5	7.4	-60.1	60.1	39	0	0
June-93	27	60.3	21.0	-39.3	39.3	33	0	0
September-93	30	53.9	12.0	-41.9	41.9	36	0	0
December-93	33	48.1	3.9	-44.2	44.2	37	0	0
March-94	36	42.9	1.1	-41.8	41.8	35	0	0
June-94	39	38.3	18.0	-20.3	20.3	27	0	0
September-94	42	34.2	76.0	41.8	41.8	34	1	34
December-94	45	30.6	80.0	49.4	49.4	38	1	38
March-95	48	27.3	3.8	-23.5	23.5	28	0	0
June-95	51	24.4	54.5	30.1	30.1	30	1	30
September-95	54	21.8	3.5	-18.3	18.3	26	0	0
December-95	57	19.4	88.5	69.1	69.1	40	1	40
March-96	60	17.3	17.0	-0.3	0.3	2	0	0
June-96	63	15.5	17.0	1.5	1.5	6	1	6
September-96	66	13.8	53.0	39.2	39.2	32	1	32
December-96	69	12.3	1.5	-10.8	10.8	24	0	0
March-97	72	11.0	1.0	-10.0	10.0	23	0	0
June-97	75	9.8	4.4	-5.4	5.4	20	0	0
September-97	78	8.8	11.0	2.2	2.2	12	1	12
December-97	81	7.8	5.2	-2.6	2.6	13	0	0
March-98	84	7.0	14.0	7.0	7.0	21	1	21
June-98	87	6.3	1.6	-4.7	4.7	19	0	0
September-98	90	5.6	4.4	-1.2	1.2	4	0	0
December-98	93	5.0	1.0	-4.0	4.0	17	0	0
March-99	96	5.0	12.0	7.0	7.0	22	1	22
June-99	99	5.0	3.0	-2.0	2.0	9	0	0
September-99	102	5.0	6.4	1.4	1.4	5	1	5
December-99	105	5.0	1.0	-4.0	4.0	18	0	0
March-00	108	5.0	2.3	-2.7	2.7	14	0	0
June-00	111	5.0	3.1	-1.9	1.9	8	0	0
September-00	114	5.0	7.1	2.1	2.1	11	1	11
December-00	117	5.0	3.0	-2.0	2.0	9	0	0
March-01	120	5.0	3.4	-1.6	1.6	7	0	0
June-01	123	5.0	23.0	18.0	18.0	25	1	25
September-01	126	5.0	6.0	1.0	1.0	3	1	3
March-02	132	5.0	2.1	-2.9	2.9	15	0	0
September-02	138	5.0	1.2	-3.8	3.8	16	0	0

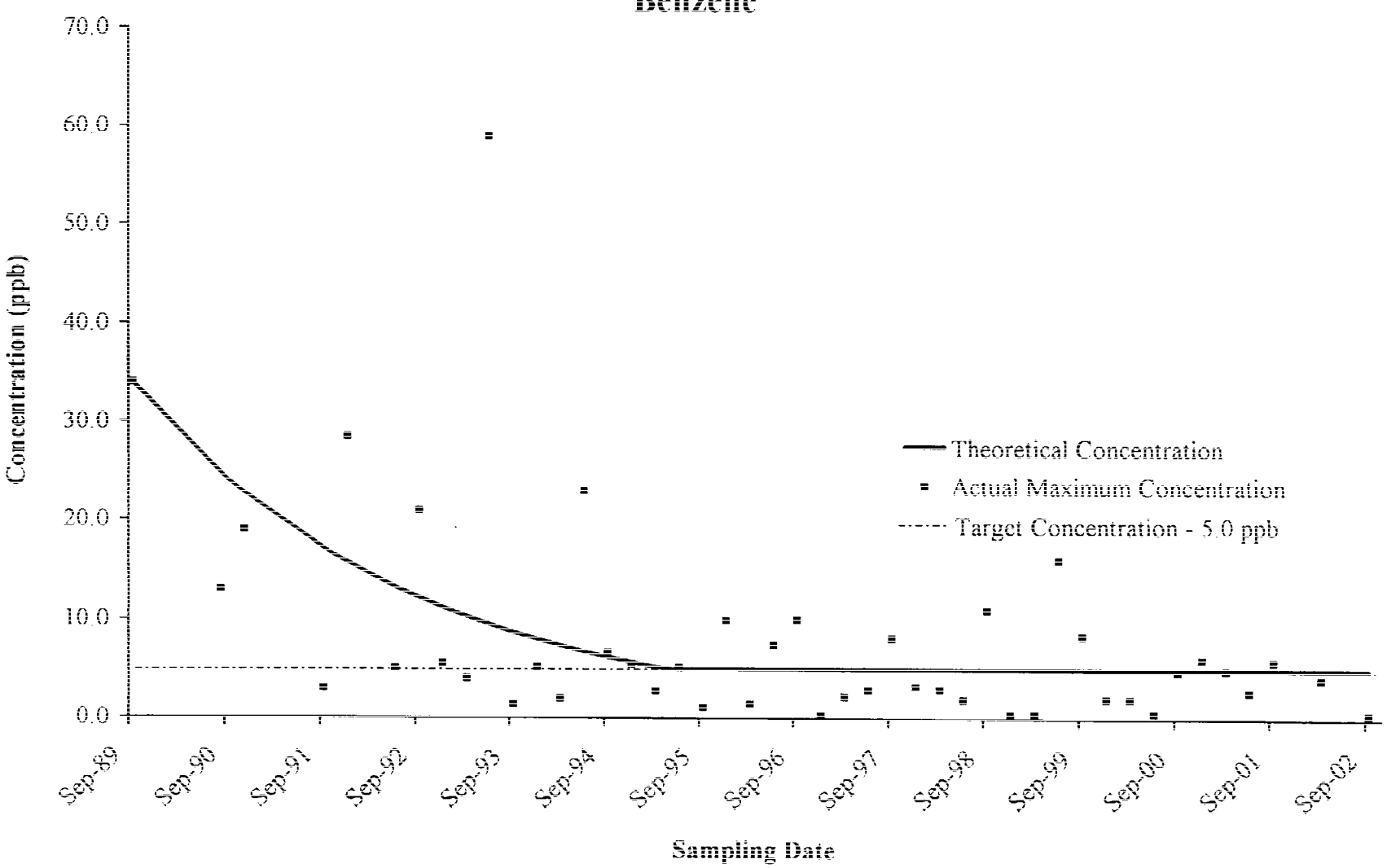
Signed Rank Test Passed Since $T^+ =$ **Sum$(R_i)(W_i)$ =** **279**

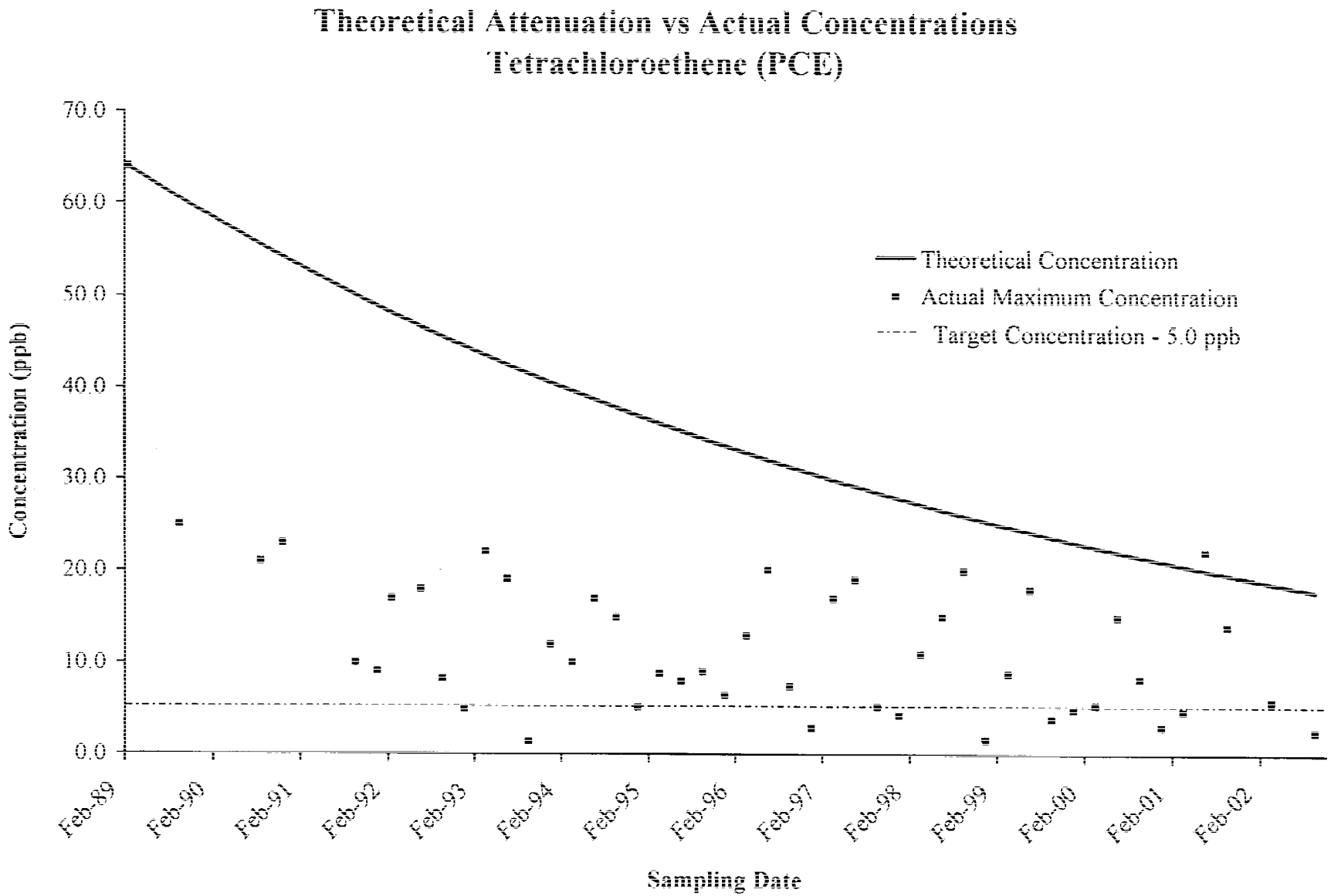
$T^+ < t(\alpha,n)$ $t(\alpha,n) =$ **720**

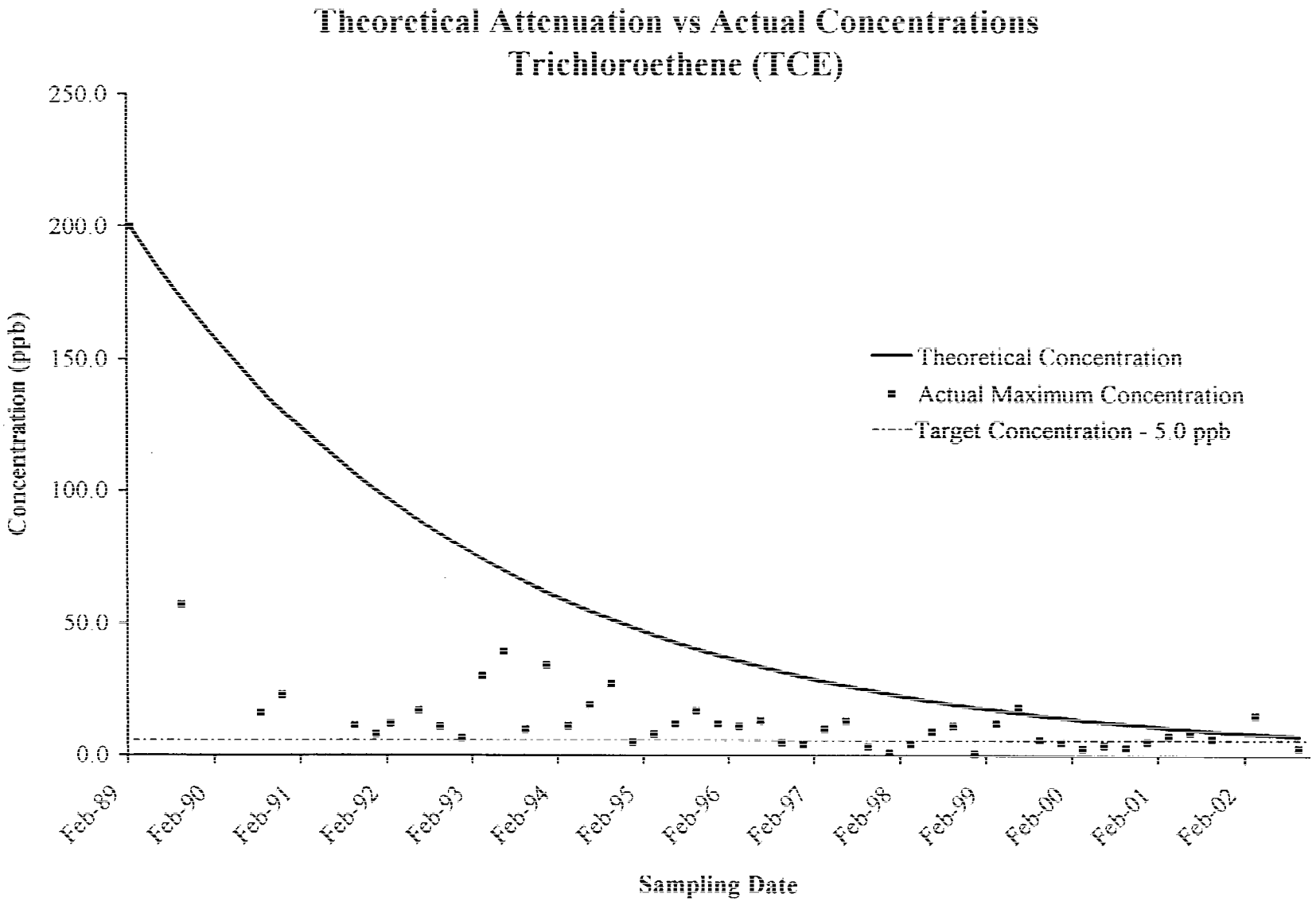
Appendix C

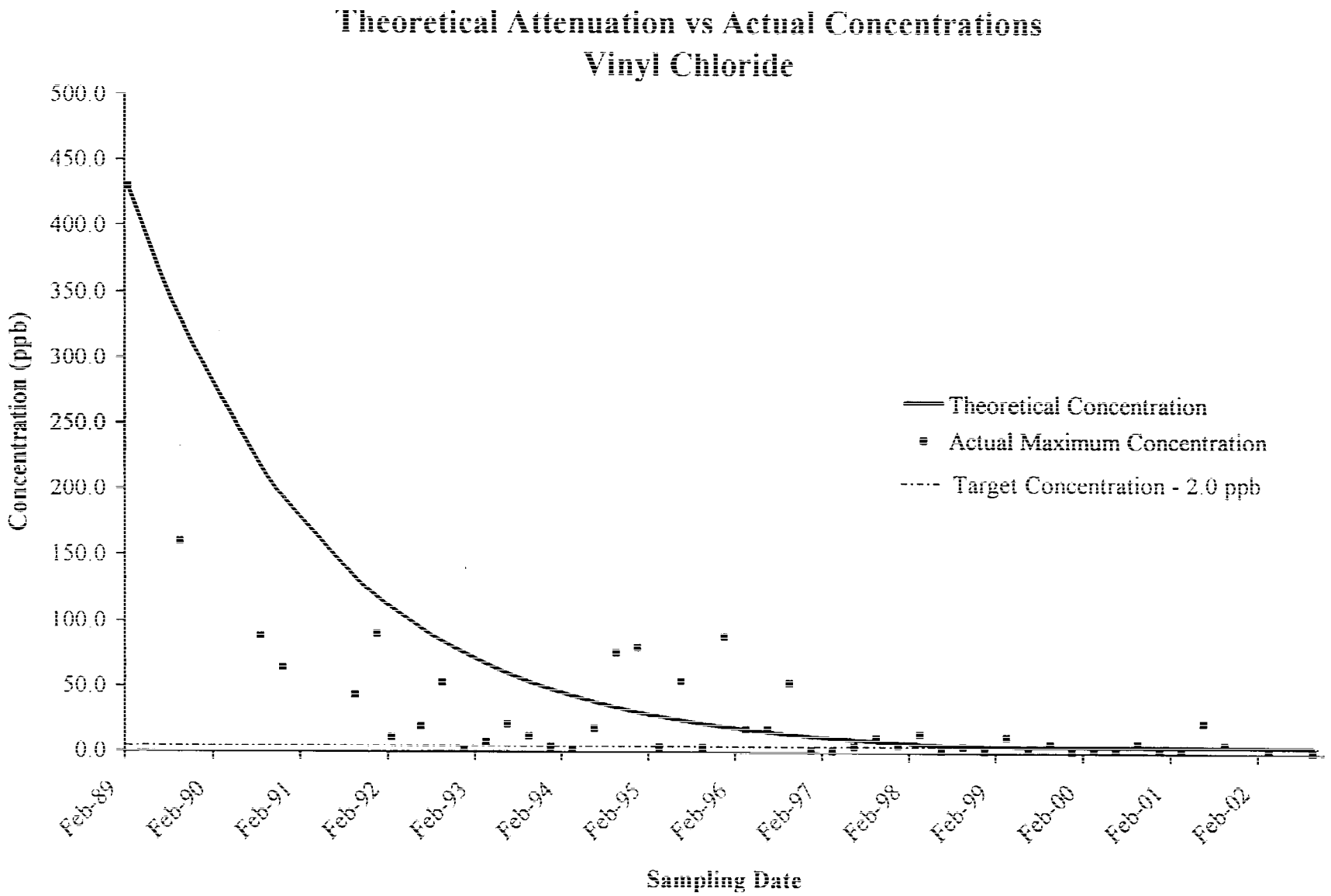
Figures Documenting Remedy Performance

Theoretical Attenuation vs Actual Concentrations
Benzene

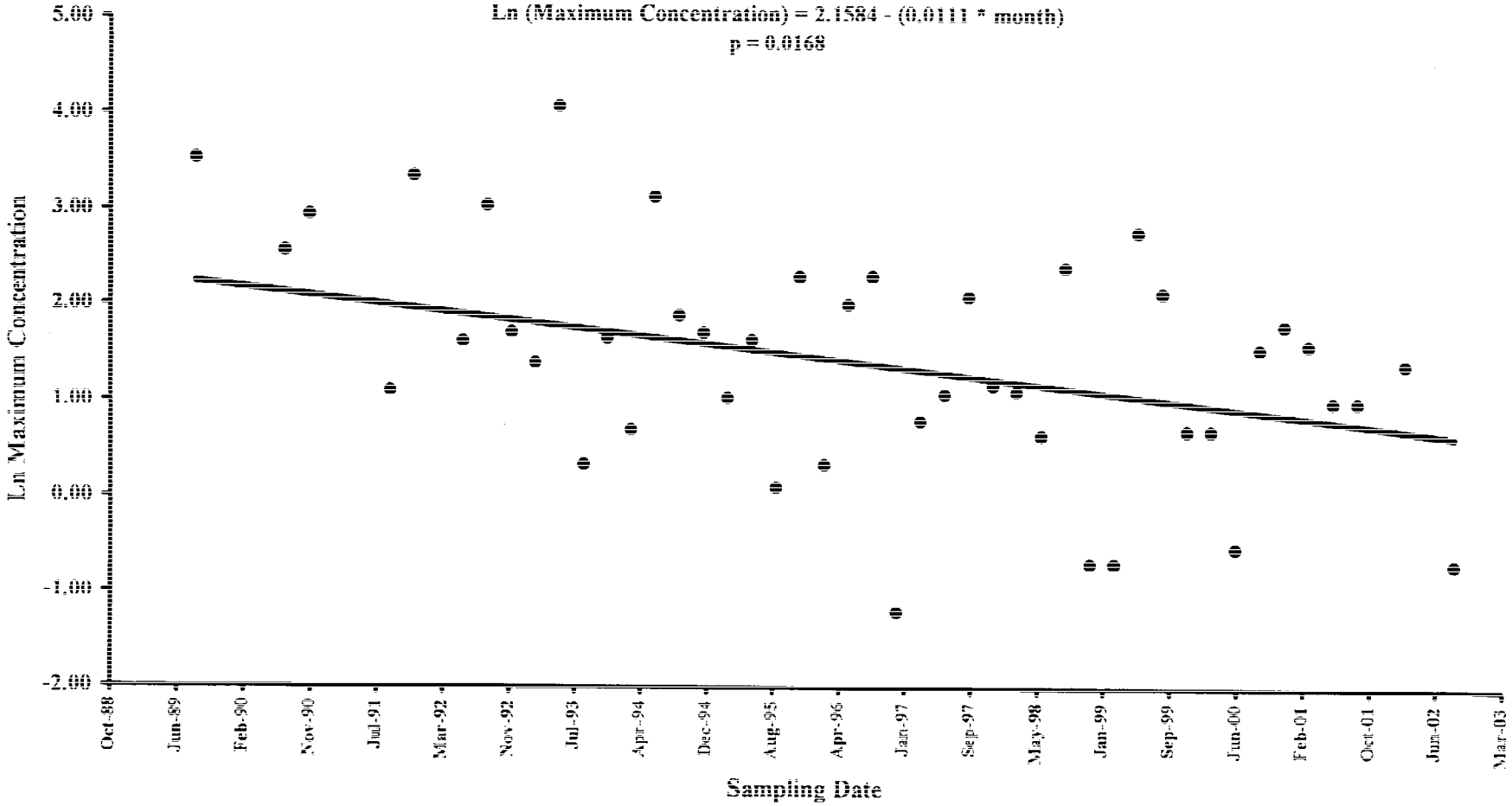



Theoretical Attenuation vs Actual Concentrations
Tetrachloroethene (PCE)
Concentration (ppb)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Feb-89
Feb-90
Feb-91
Feb-92
Feb-93
Feb-94
Feb-95
Feb-96
Feb-97
Feb-98
Feb-99
Feb-00
Feb-01
Feb-02
Sampling Date
Theoretical Concentration
Actual Maximum Concentration
Target Concentration - 5.0 ppb


Theoretical Attenuation vs Actual Concentrations
Trichloroethene (TCE)
250.0
200.0
150.0
100.0
50.0
0.0
Concentration (ppb)
Theoretical Concentration
Actual Maximum Concentration
Target Concentration - 5.0 ppb
Feb-89
Feb-90
Feb-91
Feb-92
Feb-93
Feb-94
Feb-95
Feb-96
Feb-97
Feb-98
Feb-99
Feb-00
Feb-01
Feb-02
Sampling Date

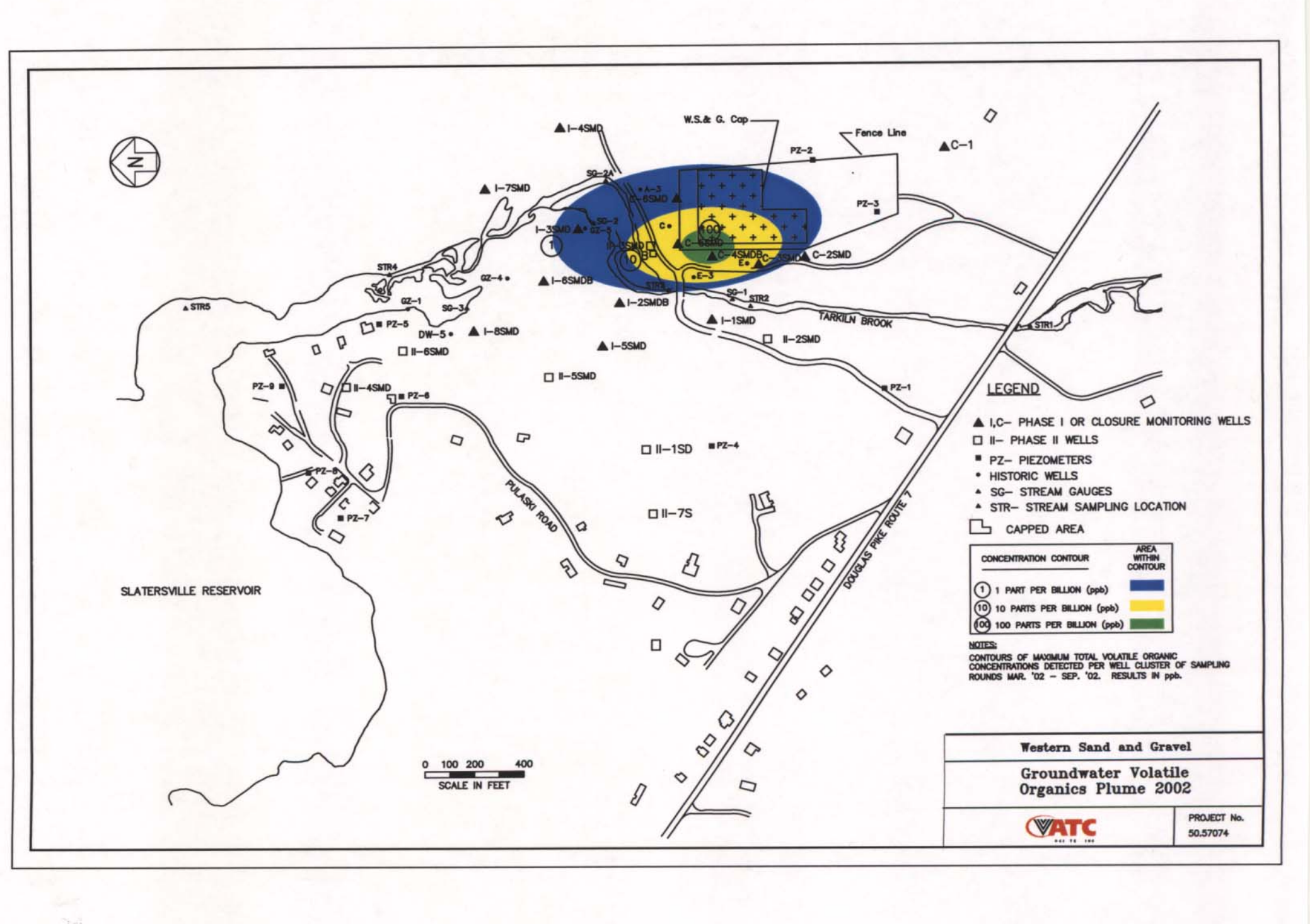

Theoretical Attenuation vs Actual Concentrations
Vinyl Chloride
Concentration (ppb)
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Feb-89
Feb-90
Feb-91
Feb-92
Feb-93
Feb-94
Feb-95
Feb-96
Feb-97
Feb-98
Feb-99
Feb-00
Feb-01
Feb-02
Sampling Date
Theoretical Concentration
Actual Maximum Concentration
Target Concentration - 2.0 ppb

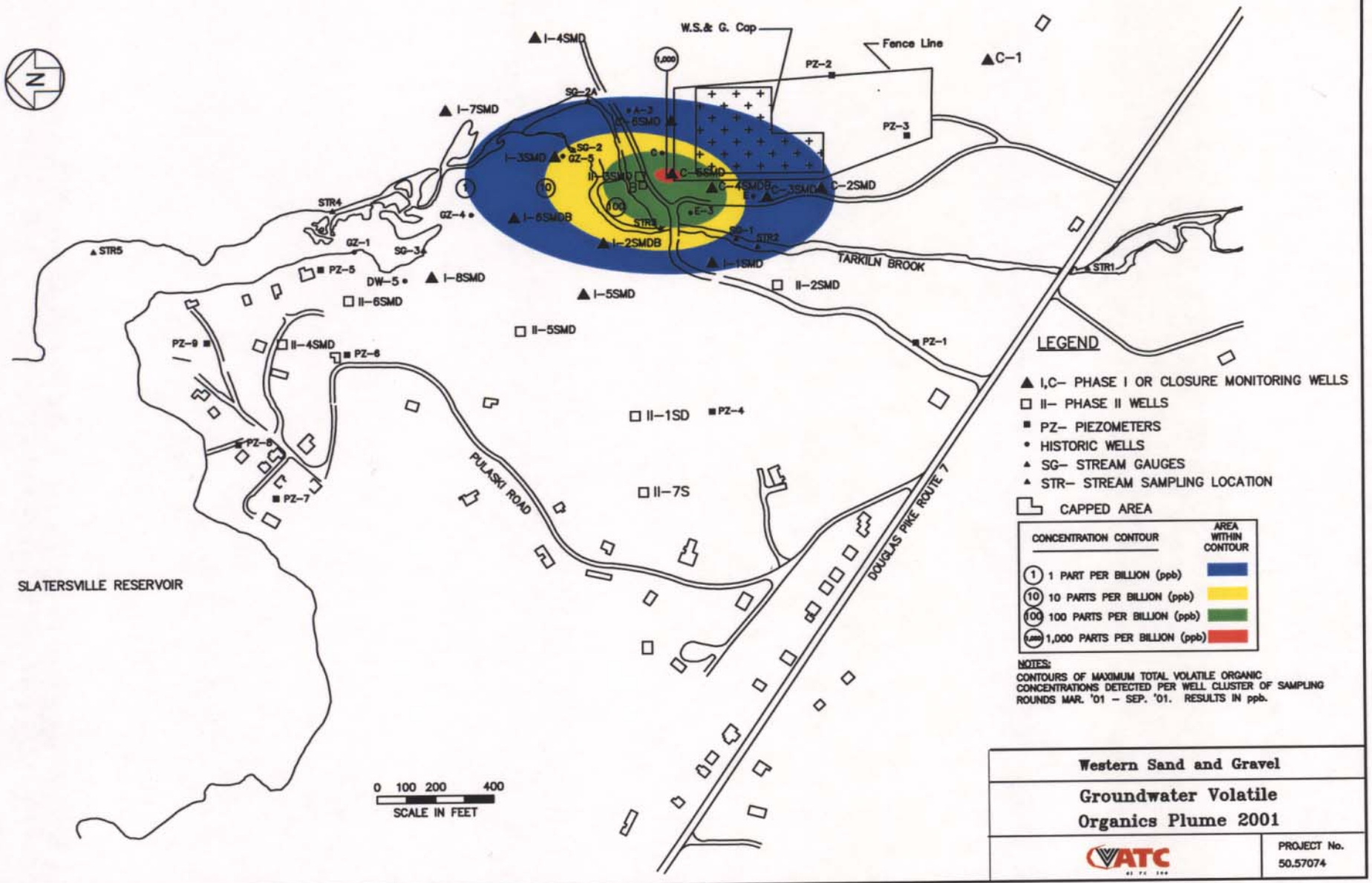
Least Squares Regression
Benzene

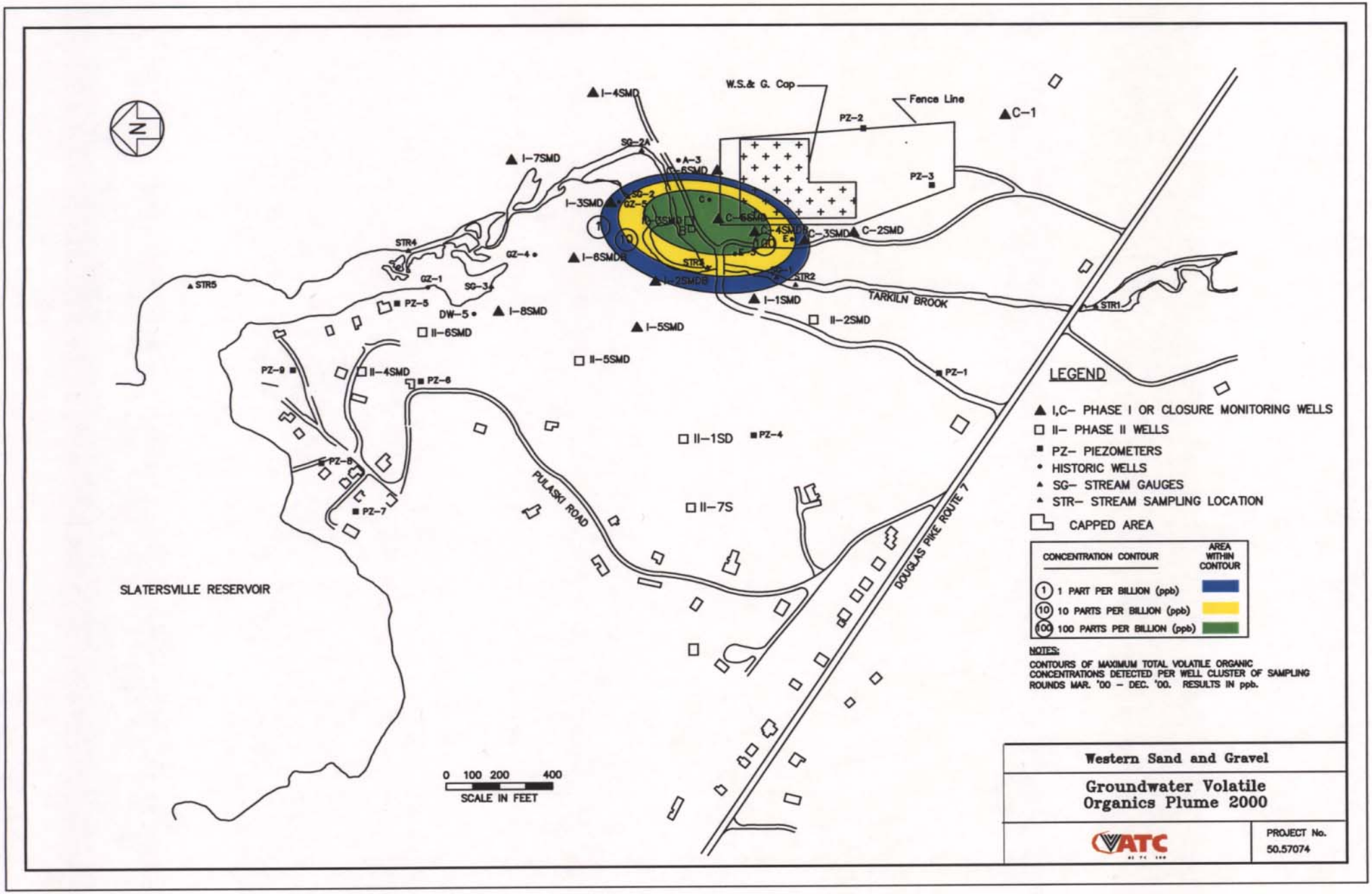


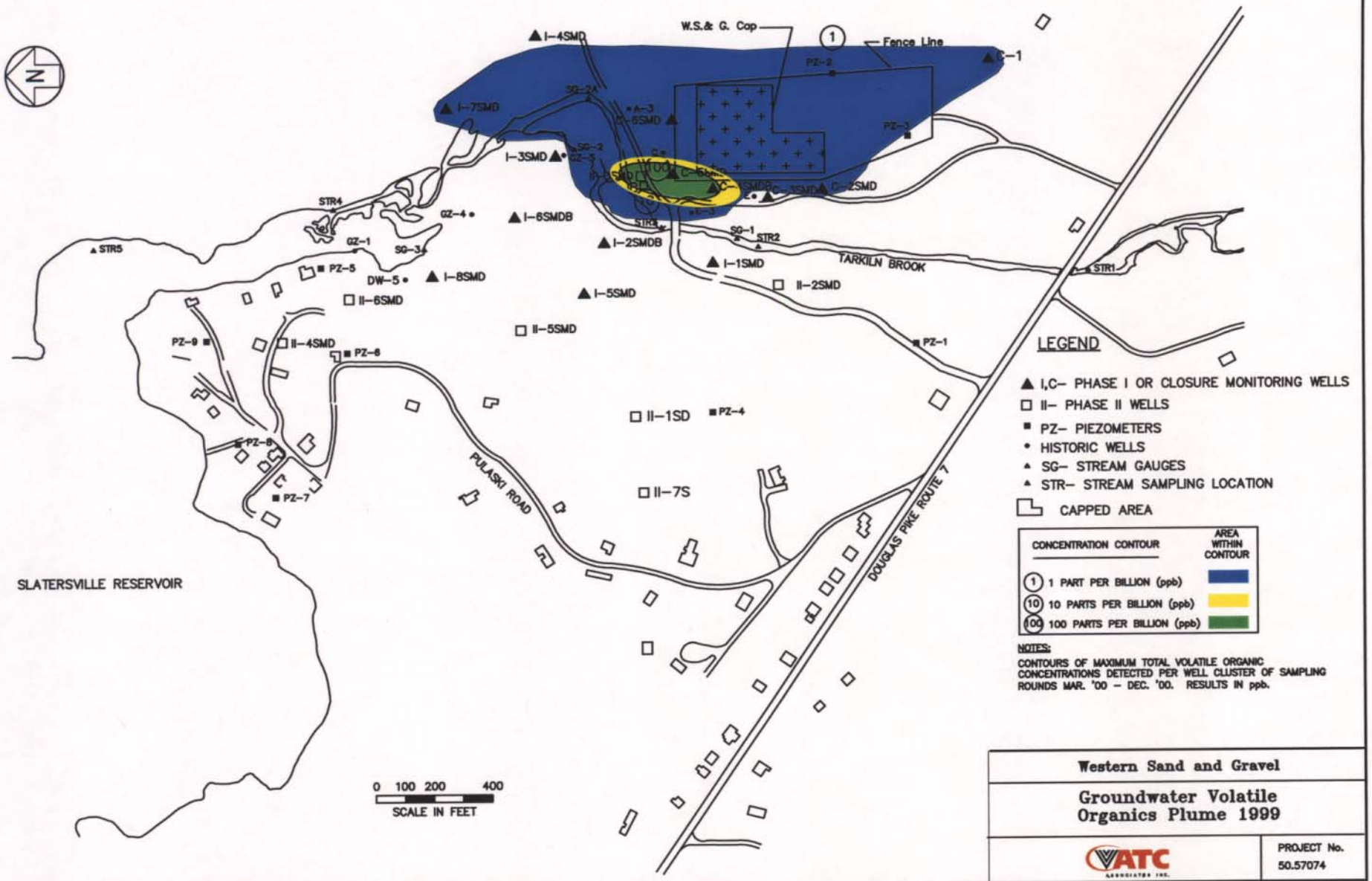
Appendix D

Annual Isoconcentration Maps


N
W.S.& G. Cap
Fence Line
I-4SMD
C-1
PZ-2
I-7SMD
SG-24
A-3
C-6SMD
PZ-3
I-3SMD
SG-2
GZ-5
C-5SMD
C-2SMD
C-4SMDB
C-3SMD
E-3
STR4
GZ-4
I-6SMDB
SG-1
STR2
STR5
GZ-1
SG-3
I-2SMDB
I-1SMD
TARKILN BROOK
STR1
PZ-5
DW-5
I-8SMD
II-2SMD
II-6SMD
I-5SMD
II-5SMD
PZ-9
II-4SMD
PZ-6
PZ-1
II-1SD
PZ-4
PZ-8
PULASKI ROAD
PZ-7
II-7S
DOUGLAS PIKE ROUTE 7
SLATERSVILLE RESERVOIR
0 100 200 400
SCALE IN FEET
LEGEND
I,C- PHASE I OR CLOSURE MONITORING WELLS
II- PHASE II WELLS
PZ- PIEZOMETERS
HISTORIC WELLS
SG- STREAM GAUGES
STR- STREAM SAMPLING LOCATION
CAPPED AREA
CONCENTRATION CONTOUR
AREA WITHIN CONTOUR
1 PART PER BILLION (ppb)
10 PARTS PER BILLION (ppb)
100 PARTS PER BILLION (ppb)
NOTES:
CONTOURS OF MAXIMUM TOTAL VOLATILE ORGANIC CONCENTRATIONS DETECTED PER WELL CLUSTER OF SAMPLING ROUNDS MAR. '02 - SEP. '02. RESULTS IN ppb.
Western Sand and Gravel
Groundwater Volatile Organics Plume 2002
ATC
PROJECT No.
50.57074


N
W.S.& G. Cap
Fence Line
I-4SMD
I-7SMD
I-3SMD
II-3SMD
C-6SMD
C-4SMDB
C-3SMD
C-2SMD
C-1
PZ-2
PZ-3
SG-2A
SG-2
GZ-5
GZ-4
GZ-1
SG-3
STR4
STR5
STR3
STR2
STR1
SG-1
I-6SMDB
I-2SMDB
I-1SMD
I-8SMD
I-5SMD
II-6SMD
II-5SMD
II-2SMD
II-4SMD
II-1SD
II-7S
PZ-1
PZ-4
PZ-5
PZ-6
PZ-7
PZ-8
PZ-9
DW-5
TARKILN BROOK
PULASKI ROAD
DOUGLAS PIKE ROUTE 7
SLATERSVILLE RESERVOIR
0 100 200 400
SCALE IN FEET
LEGEND
I,C- PHASE I OR CLOSURE MONITORING WELLS
II- PHASE II WELLS
PZ- PIEZOMETERS
HISTORIC WELLS
SG- STREAM GAUGES
STR- STREAM SAMPLING LOCATION
CAPPED AREA
CONCENTRATION CONTOUR
AREA WITHIN CONTOUR
1 PART PER BILLION (ppb)
10 PARTS PER BILLION (ppb)
100 PARTS PER BILLION (ppb)
1,000 PARTS PER BILLION (ppb)
NOTES:
CONTOURS OF MAXIMUM TOTAL VOLATILE ORGANIC CONCENTRATIONS DETECTED PER WELL CLUSTER OF SAMPLING ROUNDS MAR. '01 – SEP. '01. RESULTS IN ppb.
Western Sand and Gravel
Groundwater Volatile Organics Plume 2001
ATC
PROJECT No.
50.57074


N
W.S.& G. Cap
Fence Line
I-4SMD
C-1
PZ-2
SG-2A
I-7SMD
A-3
C-6SMD
PZ-3
I-3SMD
SG-2
GZ-5
C-5SMD
C-4SMD
C-3SMD
C-2SMD
STR4
GZ-4
I-6SMDB
STR3
I-2SMDB
STR2
STR5
GZ-1
SG-3
PZ-5
DW-5
I-8SMD
I-1SMD
TARKILN BROOK
STR1
II-6SMD
I-5SMD
II-2SMD
II-5SMD
PZ-9
II-4SMD
PZ-6
PZ-1
LEGEND
II-1SD
PZ-4
PZ-8
PZ-7
PULASKI ROAD
II-7S
DOUGLAS PIKE ROUTE 7
SLATERSVILLE RESERVOIR
I,C- PHASE I OR CLOSURE MONITORING WELLS
II- PHASE II WELLS
PZ- PIEZOMETERS
HISTORIC WELLS
SG- STREAM GAUGES
STR- STREAM SAMPLING LOCATION
CAPPED AREA
CONCENTRATION CONTOUR
AREA WITHIN CONTOUR
1 PART PER BILLION (ppb)
10 PARTS PER BILLION (ppb)
100 PARTS PER BILLION (ppb)
NOTES:
CONTOURS OF MAXIMUM TOTAL VOLATILE ORGANIC CONCENTRATIONS DETECTED PER WELL CLUSTER OF SAMPLING ROUNDS MAR. '00 – DEC. '00. RESULTS IN ppb.
0 100 200 400
SCALE IN FEET
Western Sand and Gravel
Groundwater Volatile Organics Plume 2000
VATC
PROJECT No.
50.57074


N
W.S.& G. Cap
Fence Line
I-4SMD
I-7SMD
I-3SMD
I-6SMDB
I-2SMDB
I-1SMD
I-8SMD
I-5SMD
II-6SMD
II-5SMD
II-4SMD
II-2SMD
II-1SD
II-7S
C-1
C-2SMD
C-3SMD
PZ-1
PZ-2
PZ-3
PZ-4
PZ-5
PZ-6
PZ-7
PZ-8
PZ-9
DW-5
GZ-1
GZ-4
SG-1
SG-2
SG-3
SG-2A
STR1
STR2
STR3
STR4
STR5
TARKILN BROOK
PULASKI ROAD
DOUGLAS PIKE ROUTE 7
SLATERSVILLE RESERVOIR
0 100 200 400
SCALE IN FEET
LEGEND
I,C- PHASE I OR CLOSURE MONITORING WELLS
II- PHASE II WELLS
PZ- PIEZOMETERS
HISTORIC WELLS
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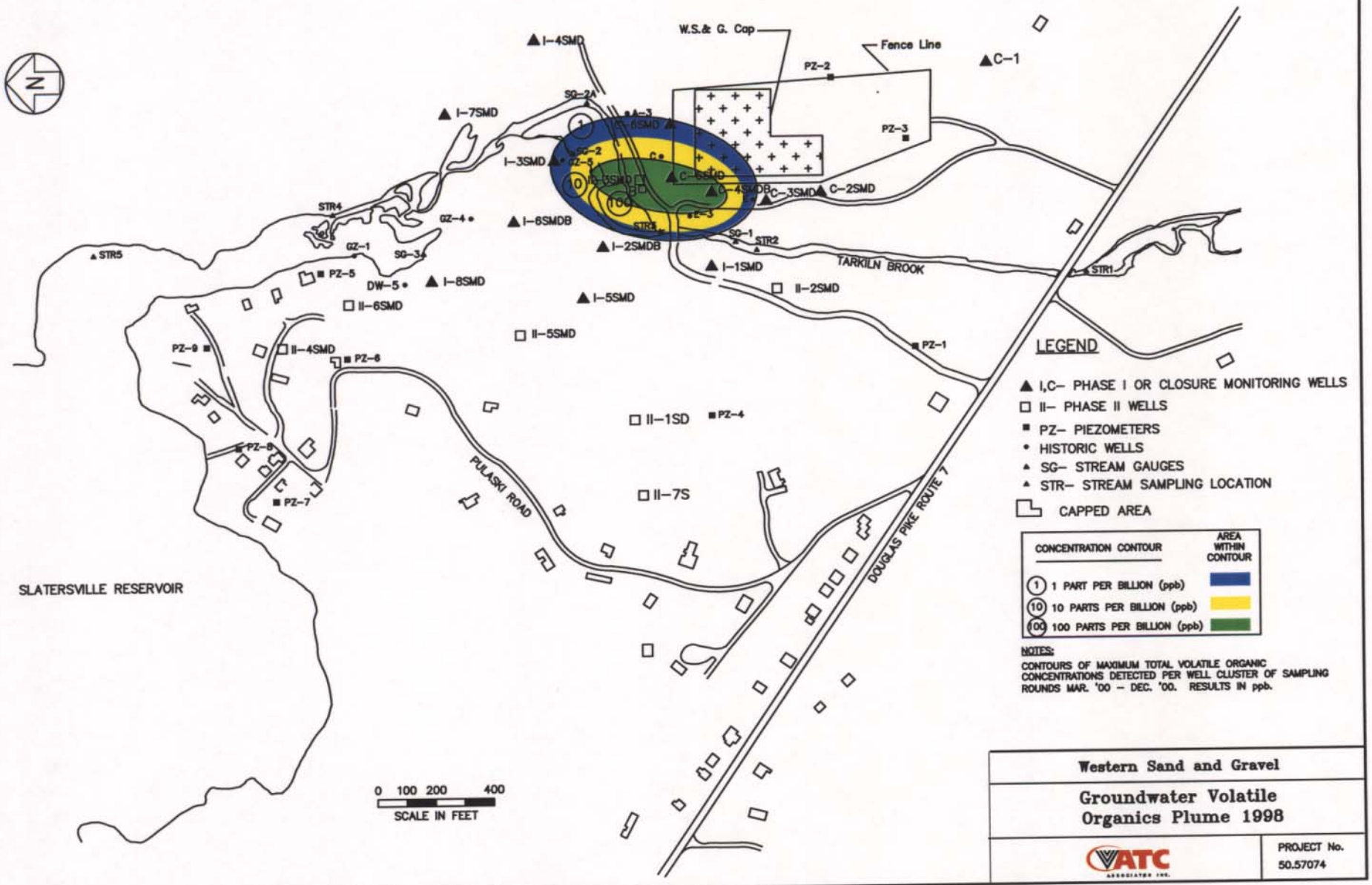
STR- STREAM SAMPLING LOCATION
CAPPED AREA
CONCENTRATION CONTOUR
AREA WITHIN CONTOUR
1 1 PART PER BILLION (ppb)
10 10 PARTS PER BILLION (ppb)
100 100 PARTS PER BILLION (ppb)
NOTES:
CONTOURS OF MAXIMUM TOTAL VOLATILE ORGANIC CONCENTRATIONS DETECTED PER WELL CLUSTER OF SAMPLING ROUNDS MAR. '00 – DEC. '00. RESULTS IN ppb.
Western Sand and Gravel
Groundwater Volatile Organics Plume 1999
ATC ASSOCIATES INC.
PROJECT No.
50.57074


N
W.S.& G. Cap
Fence Line
I-4SMD
C-1
PZ-2
SG-2A
I-7SMD
A-3
C-6SMD
PZ-3
C-2
PZ-5
I-3SMD
C-5SMD
C-4SMDB
C-3SMD
C-2SMD
STR4
GZ-4
I-6SMDB
E-3
STR3
SG-1
STR2
GZ-1
SG-3
I-2SMDB
I-1SMD
TARKILN BROOK
STR1
STR5
PZ-5
DW-5
I-8SMD
II-2SMD
II-6SMD
I-5SMD
II-5SMD
PZ-1
PZ-9
II-4SMD
PZ-6
II-1SD
PZ-4
PZ-8
PULASKI ROAD
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SLATERSVILLE RESERVOIR
DOUGLAS PIKE ROUTE 7
0 100 200 400
SCALE IN FEET
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I,C- PHASE I OR CLOSURE MONITORING WELLS
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Groundwater Volatile Organics Plume 1998
ATC ASSOCIATES INC.
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